

SMALLHOLDER COFFEE FARMING IN NYERI DISTRICT: ITS INFLUENCE ON FOOD PRODUCTION

By

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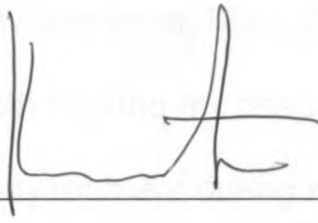


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**Project submitted in part fulfillment of the requirements for the
degree of Master of Arts (Sociology) of the University of Nairobi**

DECLARATION

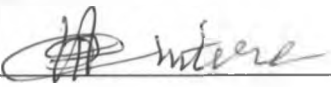
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07/01/05


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This project has been submitted for examination with our approval as university supervisors:



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DEDICATION

This work is dedicated to my late mom, Mary Wairimu and my late granny, Wa Ngetha who both molded my character and provided me with a conducive learning environment during my formative years but did not live to see the outcome of their efforts.

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ACKNOWLEDGEMENT

I wish to extend my very sincere thanks to my supervisor Prof. Chitere and Dr Mutie both who found time to read every draft of this work and made useful suggestions and criticisms; above all they constantly encouraged me in the task of writing this project. I am therefore greatly indebted to them for their guidance.

I also wish to acknowledge the contributions of Dr M. Omosa, Mr J. Njoka and Mr E. Ontita who individually read initial drafts of this work and gave insights that shaped this study's orientation.

My thanks go to managers of Githiru, Kamoko and Tabaya coffee co-operatives, Sarah of KPCU, H. Wambugu and David N. of Ministry of Agriculture (Nyeri) and all the farmers who sacrificed their time to grant me interviews – am grateful for your co-operation.

I owe special thanks to United Progressive Group for partially providing finances that enabled me undertake this program. I also take this opportunity to express appreciation for the support that I got from my family and more so, a huge debt of gratitude owed to my brothers Waihenya, Patrick Maina and Mwangi for their unending generosity during my study period. Worthy of mention is also a special friend, Leah Wamucii whose encouragement gave me strength when times were hard.

To all who offered support in one way or another, and whom I am unable to mention individually, many thanks.

ABSTRACT

It was hypothesized that cultivation of cash crops by smallholder farmers was likely to alter their food sufficiency positions from their farm production. The study centered on the theme of allocation of farm-level factors of production and how farmers strived to counter-balance them in pursuit of both market and subsistence production. The study also examined how agricultural policies tended to favour cash crop production.

The study reflects the outcome of contradictions between traditional subsistence and modern market-oriented ideas about farming, superimposed on a social and economic structure that is ill equipped to take new developments. The imbalances emanating from the attempts to straddle between market and subsistence production reflect intricacies generated by everyday simple happenings in small holders' agriculture. They succumb to the pressure especially on land and labour, two very crucial facets of their economy. The minimal concentration on subsistence production affects the life of the farmer as a whole. The quantities of food production suffer at the hands of the market economy. Food deficiencies and unequal exchange eventually become prominent features of their agriculture.

The study's theoretical orientation focuses on the question of capitalist expansion and its effects on peasant modes of production. The trend of development through processes of market production has wrought adverse effects on peasant's subsistence production. Since their search for livelihoods in the changed situation must necessarily be within the context of exchange economy, it becomes essential to focus on how their agriculture is constrained by the ecology, hence utilization of the theory of intensification.

Several recommendations are submitted as remedial measure in so far as correcting the imbalances registered in the production processes are concerned. The recommendations underlie the need to approach rural development planning with a fuller knowledge of the potentials and internal dynamics of smallholder agriculture.

1.0 CHAPTER ONE: INTRODUCTION

1.1 Background

Africa is in the midst of a generalized agricultural crisis, the most visible symptom of which is the continent's inability to feed itself. On receiving the Africa Prize for Leadership for the Sustainable End of Hunger in Washington, Nelson Mandela in reflecting on the severity of the food problem remarked that, "Africa as a continent faces a terrible food crisis, today 47% of global famine relief is channeled to sub-Saharan Africa (Hunger Project, 1995; 3).

Agriculture is the mainstay of most African countries; it provides food, employment, income, foreign exchange, and industrial raw materials. It is dominated by market and subsistence production. The latter is characterized by traditional production techniques that yield low output, and efforts to transform the entire (agricultural) sector are concentrated on the export sub-sector (Mackenzie and Taylor, 1992). This has inevitably affected food production adversely.

Rural populations in Africa derive their livelihoods from mainly subsistence agriculture; today, majority find themselves submerged in small-scale export production. The latter is resource-intensive; and lack of requisite resources for viable participation in export farming, has not been without implications on their nourishment from farms. For instance, findings in Papua New Guinea indicate that coffee farming causes periodic food shortages (Bourke, 1988). His study highlights that coffee is not only cultivated on more fertile soils, but that more labour is also devoted to it at the expense of staple foods; a situation which leads to low food crop output.

Agricultural policies are also observed to favor cash crop production. For example, the latter attracts generous incentives like subsidized inputs, credit, contract out-grower schemes among others. Such incentives have drawn smallholder farmers into cash crop cultivation inspite of their low capacity for such undertakings. Vagaries of world markets can mop their thin investments on export production in one sweep. Highlights from studies on sugarcane farming in Fiji and Kenya indicates that vicissitudes of cash crop markets expose smallholder farmers to vulnerabilities at times of low crop output and / or

low crop prices (Ali, 1988; Chitere, 2001). Such situations can precipitate widespread hunger especially where farmers neglect food crops in order to concentrate on production for export.

The smallholder susceptibility to external forces is best seen in the context of the 1980s when most sub-Saharan countries implemented the donor's structural adjustment programs (SAP's), whose one key policy was market liberalization. Among other reasons, the donor assumption was that market liberalization would raise smallholder incomes through market-oriented (export) agricultural production; the accruing revenues would then enable them purchase more farm inputs and hence expand production (Devereux, 1997; World Bank, 1995). This market-oriented farming by implication de-emphasized subsistence production which it was assumed would be fulfilled through the markets (manufactured/ imported foods). Paradoxically, years of export production have only entrenched smallholder farmers further into income and food insecurities.

Contrary to donors' perception on the improvement of agriculture through production for the market, scholars agree that heavy reliance on imports of food and farm inputs excessively expose farmers to adverse fluctuations of the world market (Meilink, 1985; Sen, 1981). The latter observed that having to establish command over food through the market can indeed add a further source of vulnerability; in that market conditions may undergo shifts that can wipe out the livelihood- supporting income. Therefore, even though production for the market is desirable, households can cushion their livelihoods by holding onto subsistence production.

For most developing countries, the cash crop sector provides foreign exchange necessary for generation of growth in other sectors. For example, the Kenya Government has on occasions laid emphasis on the need to expand cash crop output through extensive cultivation since this enterprise commands higher foreign exchange which is instrumental in financing of imports (Kenya, 1963; 1979; 1989). Such an objective is attained through formulation of policies that give incentive to farmers to enter into cash crop production. Questions however arise, not only regarding profitability of export farming, but also extent to which it hurts/ supports food production.

Findings by Bulow and Sorensen (1998) in a study on gender dynamics and tea production among farmers in Kericho found that tea farming was unprofitable at small scale. They also report that smallholders' resources are not elastic enough to be spread over both food and cash crops without adverse effects reflected in low output on either crops. On one hand, the low cash crop output translates to low incomes that cannot shield households from looming hunger, which is on the other hand occasioned by low food crop output. The other implication of that finding is that, their participation in production of one crop, has consequences on the availability of resources that can be used for the production of the other crop.

1.2 Problem Statement

Kenya's food shortages are often attributed to be the outcomes of short-term episodic events such as droughts or crop blights (see Kenya 1979; 1981; 1984; 1994). However, hungers due to food shortages are ubiquitous, pervasive and localized in households in many parts of the country hence they are never regarded as disasters. Indeed, there are many countries exposed to comparable environmental conditions that do not suffer from such food hungers. There is therefore need for our food shortages to be analyzed as the consequence of fundamental structural factors, such as inappropriate agricultural policies and adverse features of the international commodity market system, which all interact with an ill- equipped producer base, lending it incapable of realizing its food needs directly from farms or its market- derived incomes.

Food deficits reflect only one dimension of Kenya's agrarian crisis; often overlooked is the fact that export-oriented agriculture has also performed poorly. These two dimensions of the problem are inextricably related. For example, export-oriented agriculture, which could have provided the foreign exchange earnings necessary to finance farm inputs and food imports, has been unable to do so because of fluctuating world market prices (see Kenya, 1984; 1989; 1997). Besides, the two sub-sectors rely on the same resource base at household level, and hence, how these resources are utilized for the respective crops determines productivity at both ends.

Kenya has experienced several acute food shortages, but perhaps it is the 1981 drought that was the ultimate eye-opener, for in the same year, the government responded by

legislating for the first time a national food policy (Kenya, 1981). Two major objectives are documented in this food policy paper: producing surplus agricultural output for export, and producing enough food to feed the nation. However, these objectives are critiqued as implying that much agricultural production is geared towards generation of foreign exchange and tends to equate food security with national food sufficiency thereby excluding self-sufficiency of households (Omosa, 1998). When food security is equated to having enough reserves at national level, the presumption is that households have money with which to access food from the market at all times, which is often not the case.

Other scholars (Sen, 1981; Swaminathan, 1992; Timmer, 1984) contend that although food supplies might be stable for a nation as a whole, there may still be large segments of the population whose food supplies might be insecure. For instance, Swaminathan observed that “food security is not simply synonymous with national food self sufficiency. A nation's poor and hungry people are unlikely to have access to enough food throughout the year unless they produce their own food in adequate amounts” (1992:39). This sentiment mirrors the context of the smallholder cash croppers who suffer from constant food shortages.

Whereas a number of studies have found that cash cropping has adverse effects on household food production (Ali, 1988; Bourke, 1988; Chitere, 2001), other studies have reported positive or at least neutral effects (Kennedy, 1984; 1989; Oyugi, 1984). It is therefore imperative to examine the set of issues and causal relationships obtaining within the cash and food crop sub-sectors in order to understand how pursuit of the two impacts on households' ability to be food self-sufficient. This is in acknowledgement that cash cropping can potentially influence household- level factors that can in turn affect agricultural production, the demand for labour and allocation of resources within the family (Kennedy, 1989).

According to the Nyeri District Development plans, maize yields remain low; hence the district is unable to satisfy its food needs internally (1989; 1992; 1997; 2002). Despite concerted efforts to expand agricultural output, the problem of food poverty has persisted in the region of study. For example, during diverse periods in 1980s and 1990s, a

majority of smallholder farmers in the district is reported to have been recipients of relief food ¹.

It is evident that while much attention is just focused on national food sufficiency (see Kenya, 1981; 1984; 1997), there is little due concern for one of the major actors who contributes to that process of national food self-sufficiency, smallholders. This study therefore deemed it necessary to investigate how structural factors affect farmers' participation in the cash crop market sector, and how that bears on their priorities in farm- level resource allocation between food and cash crops to in turn affect food sufficiency positions attained through farm production in Nyeri district. Specifically, the study sought to answer the following questions:

- (i) How do policies regarding coffee farming influence food crop production among smallholder farmers?
- (ii) How do such policies affect farm- level resource allocation between coffee and food crops among smallholder farmers?
- (iii) How does that resource allocation between coffee and food crops affect households' ability to be food self-sufficient through on-farm production?

1.3 Objectives of the Study

Based on the problem posed, the broad objective of this study was to examine how structural factors on agricultural policies affected farmers' participation in the cash crop market sector, and how that affected their farm- level resource allocation between food and cash crops to in turn bear down on their food sufficiency positions attained through farm production in Nyeri district. It sought to achieve the following specific objectives.

- (i) To investigate how policies about coffee farming influenced food crop production among smallholder farmers.
- (ii) To investigate how such policies affect farm- level resource allocation between coffee and food crops.
- (iii) To examine how such resource allocations translate to affect households' ability to be food self-sufficient through on-farm production.

1. Daily Nation 17th July 1984; 4th May 1994

1.4 Justification

The household is the primary unit of a social system. It has important production and reproduction functions, which ensures the continuity of society. As alluded earlier, policy perception of food sufficiency does not encompass sufficiency at household level and policies seem to relegate household's food security to the markets. Accordingly, "if the idea of food security for the ordinary man and woman in Africa is to have any meaning, then it would have to proceed in the manner of charity by having to begin at home"(Obasanjo & d'Orville, 1992; 5). Hence, there is need to understand food security at the micro-level with regard to how cash cropping affects household's ability to be food self-sufficient through on-farm production.

As has been implied in the statement of the problem, there are other reasons why there should be a serious concern on the impacts of cash cropping policies on food production. Mc Carthy and Mwangi (1982; 46) posit that, "agricultural research and policy has been biased towards problems of large-scale farms and cash crops. This concentration on large scale farming has resulted in negative effects on distribution of rural incomes and food security". Moreover, majority of Kenyans reside in rural areas and are engaged in small-scale farming; hence, their vast numbers suggest magnitude of such problems. Thus problems affecting them need to be studied.

There is also need to spare smallholders of the nightmare of prolonged and persistent food shortages, hunger and malnutrition. For it to be achieved, policy and action must be based on correct identification of the nature and underlying causes of the food problems. Although the upsurge in investigations of the food shortage crisis has made some contribution, the situation complex and the data base still weak; hence a lot more work needs to be done in data gathering, and analysis at all levels in order to achieve an understanding of the many factors that have contributed to the present situation (Ghai and Smith, 1987).

Smallholder farmers constitute the backbone of the Kenyan economy, yet their food security situation is far from improved. With four decades of supporting the economy, it is vital to study the possible effects that their participation in the exchange economy has

impacted on their potential for food production. The research would in this way point to areas warranting correction and / or strengthening.

1.5 Definition of key terms

Smallholder: the term shall be used to mean farmers who own less than 6 acres of land and pursuing food production (for subsistence and / or the market) and cash crop production simultaneously.

Household: shall be used to mean person or group of people who are bound by kinship ties and who stay together in the same homestead, under one or several roofs in a compound and have the same source of food.

Head of household: shall be used to refer to person who is in charge of day-to-day management of the farm and household activities.

Food production: though a variety of food items are cultivated in the district of study, food production shall be used to refer to maize cultivation within the context of this study. This is informed by the observation that maize (in its green, cereal or flour forms) constitutes a major staple food among smallholder units in the district of study. However, other foodstuffs like beans, potatoes, bananas shall also be accounted for.

Household food sufficiency: is the household's ability to produce within their farm units, enough food (maize) to feed the family with the result that the family has enough food for a whole season.

Food Security: This is deemed to exist when all people at all times, have physical and economic access to sufficient, safe and nutritious food to meet dietary needs and food preferences for an active and healthy life. The concept shall be used to refer to household's ability to have sufficient / adequate food throughout the season / year from own-farm production.

Cash cropping: shall be used to refer to the farming technique of cash crop (coffee) cultivation (either destined for local industries or export market) among farmers.

Policy: Is an institutional decision to seek and implement particular set of objectives.

Commodity Production: shall hereby be used to refer to agricultural production primarily meant to be exchanged for cash in the local or world markets.

2.0 CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This section examines literature relevant to the present study with a view to pointing out their strengths, weaknesses and relevance to the research problem.

In the course of reviewing literature, it emerged to the researcher that specific studies concerning influences of coffee production on food production were quite scant indeed; hence if they were to be relied upon exclusively, the scope of the present study could be extremely limited. As a result, other relevant literatures are reviewed in order to develop a logical framework for the present study so as to gain an in-depth understanding of the research problem. However, the researcher does not claim that his, is an exploratory study on the basis of the aforementioned observation.

This chapter has four sections. The first is an introduction on the evolution of cash crop farming in Kenya. The second part examines policies on cash crop farming and their possible effects on food crop production. The third part looks into how farm resources are allocated between food and cash crop production at farm level. The chapter concludes by examining two theories that best captures the subject matter of this study.

2.2 Evolution of Cash Crop Farming In Kenya

It is true that self-sufficiency in staples form the backbone of food security agenda of many nations and that households seek to provide part or their entire subsistence (Omosa, 1998); but one might question what then limits the capacity of nations and even households to successfully pursue policies that they seem to chart out for themselves and at will. This shall be answered by briefly analyzing events that led smallholder farmers to also embrace production for the market.

Prior to arrival of colonialists in Kenya, African communities mainly grew traditional food crops and kept animals for their subsistence and fulfilled other needs through barter exchange in the then non- monetized economy.

Following the scramble and partitioning of Africa by European powers, British settlers first occupied the Kenyan highlands in the 1890s after expelling indigenous Africans. The

growing of coffee in Kenya was then started on experimental basis around 1896 both at Kibwezi and Kikuyu and soon thereafter, commercial farming of coffee was started in Kiambu district (CBK, 1995). Coffee farming was however restricted to the whites, while participation of Africans was only limited to provision of labour in the coffee plantations.

Prior to 1933, the policy of the colonial government was to encourage the introduction and expansion of coffee within the "settled" areas only (see CBK, 1995). This was achieved through the provision of research and extension services and settlement loans to the whites. All coffee output was exported in semi- raw form to Britain. The study provides a sound genesis of coffee cultivation in Kenya though it is silent on the rationale for the settlers' interest in export crop production. According to Masimba (1986), the rationale behind the settlers' export-oriented production was: first, to earn revenues that could fully finance the colonial government's administrative expenses and; second, to provide cheap raw materials for the industrial complexes in Europe.

In pursuit of generation of revenues and cheap raw materials, the colonial administration sought to extract more surpluses from their colony and this was partially achieved through imposition of compulsory household taxes. This cash requirement compelled more Africans to provide / sell their labour within the coffee plantations in order to raise the taxes (see Masimba, 1986; Omosa, 1998). While African household food requirements remained the same, their labour requirements for subsistence production were diminished through alienation of more man-hours to export production. Therefore, introduction of cash crop farming compromised African households' ability to feed themselves.

The above scenario triggered a vicious cycle whereby diminished labour requirement for household food production, led to more and more reliance on meagre wages to supplement food requirements; tendency to devote still more household labour time towards the same end and the ultimate neglect of food production. The food shortages of the 1940s and 50s are attributed to the above processes. Another streak of argument reckons that the colonial administration deliberately neglected food production in order to enhance consumption of manufactured consumer products from European industries

(Mc Loughlin, 1970). These processes marked the turning point of the smallholder involvement in the monetized exchange economy.

Upon independence, the new government secured the settler estates and created settlement schemes for the landless. Though Africans were allowed to buy land from the out-going settlers, plantations under cash crops were not to be sub-divided but were rather to be bought as intact wholes. As a result, most of the cash crop plantations passed on to rich Africans (elites) or co-operatives who could afford them, while most of the peasants who erstwhile resided in “reserves” were allocated small parcels of land in relatively marginal areas (Carlstein, 1982).

At independence, the developed countries already dominated the world economy, hence the new government could only specialize in export agriculture in which it had already been inducted into and held relative comparative advantage. Thus, the mass of Africans who by colonial decree could not grow cash crops, were now actively encouraged by the new government to plant cash crops as that sector was perceived to be Kenya's engine of growth (Kenya, 1963; 1968). It was therefore to play the role of a springboard for the other economic sectors.

2.3 Cash Cropping Policies and Food Production

Before arrival of colonialists in Kenya, Africans operated outside the market economy. However, the advent of colonialism ushered them fully into the market economy through introduction of money as the medium of exchange and induction into commodity production. As noted earlier, food production was completely neglected by the colonial government and emphasis was on cash crop production. As a result, the new government inherited an agricultural sector that was structurally biased in favor of cash crops.

Given that cash crop production was the major foreign exchange earner, the new government encouraged farmers to engage in its cultivation (see Kenya, 1963). As mentioned earlier, this agricultural sub-sector was to be the springboard of Kenya's economic and industrial growth. It received growing support from the government through policies that supported research, extension services and loans for the acquisition

of inputs. However, the threshold for enjoyment of these benefits was pegged high, lending them inaccessible to small-scale farmers. For example, requirement of collateral securities as a pre-condition for loan advancement (Mc Loughlin, 1970). In the meantime, smallholder farmers struggled to raise both cash and food crops on their limited resource bases.

Though having started during the colonial times, the schism between large scale and small-scale agricultural sectors became more evident upon attainment of independence. Indeed, it gave rise to the agrarian ideology of what up to date is referred to as the modern and traditional agricultural sectors; denoting the large scale (capital-intensive mainly non-food) and small-scale (labour-intensive mainly subsistence) sectors respectively. These sectors have differential access to farm resources, with the lion's share going to the modern sector that mainly produces cash crops (see FAO, 1999). For example, to offset the demand-supply constraints of the early 1960s, the government borrowed capital from external sources most of which went to the large-scale cash crop sector (Masimba, 1986). Thus, like their predecessor, the new government's policies hindered growth of small-scale farmers and more so, overlooked investment in food crop production during the early years of independence.

Expansion of cash crop production ranks high on the government's agenda. This objective is pursued through a variety of techniques such as planting of high-yielding varieties, expansion of acreage under cash crops, intensive use of modern farming techniques, pure stand cropping, and intensification of research towards high value crops (see Kenya, 1968; 1981; 1984; 1997). Such zeal is laudable in the light of agriculture's contribution to economic growth.

According to Cohen, the rationale behind the government's emphasis on expansion of cash crop production is to help generate more foreign exchange to finance other economic sectors (1988). However, despite its pivotal role in the economy, agriculture has received little financial allocations from the government. For example, the sector received an average of less than 7% of total budgetary allocations between the years 1978 - 1995 (Kenya, 1997). Moreover, a disproportionate amount of those allocations go towards large-scale non-food sector at the expense of food production (Raikes, 1988).

Such lop-sided agricultural planning suggests a satisfaction with export-crop-driven industrial growth and agricultural stagnation.

In trying to enhance expansion of agricultural output, crop-specific institutions have been established to oversee the financing, production and marketing logistics of cash crops. For instance, "Kenya Tea Development Authority was formed to obtain international financing required for an expansion program" (Etherington, 1973:9). Thus, while the government recognizes the need to expand cash crop output and targets smallholders in order to achieve this objective, it does not recognize their food production objectives by way of equally strengthening their (food) production infrastructures across board. Instead, what is adopted is an approach of setting district and provincial targets for production in respect of important cash and food crops (see Kenya, 1963). Agricultural development has as a result become locational and crop- specific.

Specialized government-affiliated institutions mainly do technical agricultural research. Accordingly, research and extension policies are crop-based with even whole research stations devoted to one (usually export) crop (Mc Carthy and Mwangi, 1989). It is posited that this bias has led to a strong predilection towards single and monocropping since both research and extension are concerned with one crop and not the whole farming system. Uptake of such innovations has been low among smallholder farmers whose inclination to mixed cropping system is due to the perceived 'insurance' effect of failure of one crop. Nevertheless, even where information is disseminated, its adoption is minimal because the required crop husbandry practices call for use of expensive inputs and a high degree of technical knowledge that might be lacking among smallholder farmers.

As observed above, both research and extension are largely crop-based. It is highlighted that programs to increase food productivity in the country are normally implemented by the extension service of ministry of agriculture or specific crop authorities (Chitere, 1980). Similarly, extension programs for coffee cultivation in Tanzania focus on pure stand holdings and thus ignored the vast of smallholders who commonly intercrop coffee with bananas (Msechu, 1979). Accordingly such single-crop focus served to push smallholder farmers from the orbits of agricultural development.

Farmers in the different agro-ecological zones engage in production of different crops suited to their environments thereby supporting the economy as producers. Observations are however made that governments deliberately move terms of trade against the rural farmers, majority of who are smallholders (Cleaver, 1984; Devereux, 1997; Raikes, 1988). For instance, the former highlights that heavy taxes extracted from farmers' produce are diverted to other enterprises like raising public fund revenue, keeping food prices low in urban areas among others. In this sense, low producer prices can also be artificially induced by policies of the day.

Agricultural producer prices have not been favorable to farmers. The persistently low price farmers receive for their crops can warrant questioning of their rationality in farm decision-making. Some scholars deem them to be rational in their production behavior in that they are observed to be responsive to market signals for their products, with increases in output when higher prices are prevailing or anticipated and vice versa. For example, it is observed that when coffee prices collapsed in Uganda in the 1970s and 80s, most smallholders smuggled their coffee to Kenya where prices were higher (Bienen 1983). On the contrary, some scholars debunk this rationality thesis and argue that, smallholders do not apply the rational farm management model in their farming systems; hence the observation that they remain steeped into market production even at deteriorating price relations (Streeten and Elson, 1971). They cited factors like unsuitability of land for other alternative crops and the fact that low crop prices seldom induce growers to up-root coffee trees that are still yielding to support their position. Fundamentally, the above observations brings to the fore the versatility of smallholders in their ability to shift production (and related costs) from one line to another in response to changing circumstances.

Smallholders have been victims of nutrition and food insufficiency; this plight was first recognized in 1979. This concern is captured in the expression that, "one category of the food vulnerable, includes smallholder farmers engaged in production for export. They tend to have insufficient food in certain times of the year" (Kenya, 1979; 146). Paradoxically, despite the implicit admission that cash cropping jeopardize food production capacity, one major objective for the same plan period was to encourage

them to participate in the exchange economy through cash crop production. This position indicates that the government seeks to enable farmers access food from the markets through incomes derived from cash crops. Thus, it does not seem to regard participation in commodity production as one probable factor predisposing farmers to food vulnerabilities.

In view of the growing recognition of the food shortages in the country, the government finally formulated a national food policy plan (Kenya, 1981). The document outlines 3 major objectives with regard to food security; first, maintenance of a position of broad self-sufficiency on main foodstuffs in order to avoid food imports; second, to achieve food security for each area of the country; and third, to increase production of non-food crops for industrial and export markets. The plan suggests various ways and means for increasing smallholder food productivity. In particular, a variety of policy incentives are to be given to the smallholders such as high and stable food product prices, low input prices, improved marketing among others, all designed to minimize probability of food shortages in future.

From that brief examination, it is instructive that the document deals with food security concerns at an aggregate level. Prominent scholars have supported this position; for example, its definition of food security does not encompass food sufficiency at household level; and moreover, a major objective of the plan suggests that much agricultural production is to be geared to export production for the generation of foreign exchange (Omosa, 1998; Swaminathan, 1992).

It is also observed that the food plan has done did little to alter the inherent structural biases which favor cash crop production at the expense of food production. For example, Omosa (1998) argues that from the document, national self-sufficiency is to be attained by mobilizing food surpluses especially from high potential areas to the national grain reserves from where it would then be channeled to food deficit areas at regulated prices. The implied locational specialization of food production suggests that little or no attention is given to enhance food production capacity in medium and low potential zones; which in most cases are utilized for other market- oriented commodities.

Cash cropping has become an over-riding priority among farmers and at policy level to an extent that those living in areas where staple crops can yield better returns than cash crops, are invariably engaged in devoting most of their resources to cash crop production (see Kenya, 1979). Indeed, farmers have been severally urged to diversify their cropping pattern in favor of high value cash crops which not only generates higher incomes but also more employment per hectare (Kenya, 1986; 1989). However, potential benefits of cash crops have not materialized and instead, poor and delayed remuneration have continued to contribute to farmers' incapacity to meet their food needs on the market.

Other scholars have also sought the sources of food shortages in the organizational structure of agricultural production (Chitere, 2001; Eicher and Staaz, 1984 Kleist, 1985). For example, agricultural policies favoring large scale export and industrial crop production is a major factor highlighted as causing food insecurities among smallholder farmers in Western province (Chitere, 2001; Kleist, 1985). Other specific causal factors cited include low and delayed incomes from cash crops and allocation of most resources to the latter at expense of food crops.

Like the national food plan, the thrusts of the 1983-79 and 1984-88 development plans relegates the national food sufficiency objective to being met from domestic supplies, hence broad self-sufficiency in basic foodstuffs. This is to be achieved mainly through provision of agricultural service that would supply new technologies (see Kenya, 1979; 1984). However, factors that have been identified as hindering farmers' adoption of those technologies includes their unfeasibility for allocation of credit to enable them acquire technology and inputs; and their concern with production for subsistence raising fears that loans lent to them cannot be realized (Ontita, 1995). In short, participation in market production seem to be a condition for their being considered for allocations.

Though the 1989-93 development plan has its priorities as production of food, raw materials for local and export markets; its objective of self-sufficiency is to be fulfilled through maintenance of strategic reserves channeled from high potential areas; more so, increased food productivity is to be achieved through application of technology (see Kenya, 1989). Accordingly, it implies that resources would be aimed at commercial farmers (who mainly produce for the market) in high potential areas.

The Nyeri District Development Plan (1989) indicates that the major objective for the period is to expand food production especially that of maize. It also notes that the district has limited land for food production; therefore, the envisaged growth in food production can only be achieved through intensification of farming. Among reasons cited for low maize yields in the preceding years are bad weather, lack of inputs, improper technology and farmers involvement in cash crop production. The latter observation notwithstanding, the same plan proposes expansion of acreage under coffee as the major strategy for achieving increased coffee output. It is noteworthy here that strategies to expand food and cash crop outputs conflict, since expanding acreage under coffee might inevitably compel farmers to cede part of land under food crops.

The national development plan for 1994-96 highlights that food security can be achieved through food production, storage of food, food imports and purchases. Its proposal to enhance agricultural productivity is through provision of incentives to farmers such as remunerative prices, available and affordable inputs, effective research and extensions, timely payment and affordable credit among others. However, it is noted in the same plan that as a result of increase in per unit cost of food production, AFC bank reduced financing for the same from 80% to about 35% (see Kenya, 1994). Thus, unavailability of finance continues to hinder growth of food production among farmers.

In the 1997 development plan, inadequate rural infrastructure, dependence on rain-fed agriculture, inadequate use of inputs and inaccessibility to credit are highlighted as the major constraints to agricultural growth (see Kenya, 1997). The regularity with which such highlights seem to recur in other development plans, in conclusion begs the question, how far do we make to move towards achievement of agricultural targets between one plan period and another, and are any positive steps meant for short term/ alleviative relief or milestones of permanent growth?

2.4 Resource allocation at farm level and their effects on households' cash and food crop output

The foregoing section has examined how cash cropping policies have at every turn affected food production among smallholder farmers. Food shortages have thus come to

permanently characterize majority of smallholder households engaged in cash crop production thereby assuming a form of permanent hunger, but one that is largely camouflaged. This section examines whether cash cropping does, in any way, affect land use patterns at farm level and what such portends to household's food security attained via farm production.

Studies done by Bourke (1988) and Kennedy (1984; 1989) report that cash cropping improves food security status of farmers; and both argue that resources should be devoted to high value non-food crops whose incomes enable households to access food in the market. The thrust of these studies is that incomes deriving from cash crop production provide a buffer against food insecurities that might arise from low food crop production. Their concern is therefore on extent to which farm households are enabled to access food in the markets by incomes deriving from cash crops. Indeed, even though those studies were done during the pre-liberalization regime, Kennedy notes that profitability from cash crops would have been negative between 1979 – 86 would the government have set cane prices using market price as the benchmark (1989). Such views imply that left to market forces, households' food security must necessarily remain subject to vicissitudes of the markets.

Households' farm resources are not infinitely elastic. As a result, their use in one farm enterprise simultaneously affects their availability to other enterprises. In his study on the economic influence of tobacco farming on food production, Oyugi reports a complementarity in resource utilization between the two categories of crop (1984). He observes that when farmers rotate maize and tobacco, the former yields higher output when on a plot previously planted with tobacco. The study also reports that the resultant high yields on either crop are consequently sold to facilitate purchase of more inputs to step up production for both crops; hence his conclusion of a complementarity in resource utilization.

Contrary to the above conclusions is a thesis by a notable scholar that different crops whatever their final use, compete for land, labour and inputs (Raikes, 1988). He argues that such increased food crop yields should be expected due to the residual fertilizer effects, which is only valid where tobacco and food crops are rotated. It logically follows

that Oyugi's findings are limited to inputs-intensive cash crops that again have short gestation periods hence amenable to crop rotation. Indeed, his observed increased yields could be directly attributed to application of yield-enhancing inputs rather than complementarity in resource utilization

Labour is another important component in farm production whose allocation in one enterprise affects its availability to others. Agricultural peak seasons are often affected by labour bottlenecks that can latter be reflected in reduced crop output. In Papua New Guinea, Bourke found a conflict in labour time allocation between coffee and potatoes production in (1988). He reports that experts contended that neglect of food gardens during coffee harvest seasons result in shortages of food output. This is in view of the fact that coffee peak-seasons are labour intensive owing to the ripened beans' susceptibility to deteriorate with passage of time. Due to resource limitations, majority of smallholders can hardly afford to hire extra labour during such seasons; hence mainly rely on family labour that is often scarcely sufficient. As a result, timely performance of other crucial farm operations like planting and weeding can be delayed resulting to reduced food crop output.

Similar findings are reported in a study among smallholder irrigation rice farmers in Mwea (Mc Carthy and Mwangi, 1982). The study reveals that food shortages and malnutrition abound in rice-growing households, which are unable to raise their own food crops due to long working hours in the rice fields. They further observe that rice incomes are low and delayed, hence cannot enable households to access food from markets throughout the year. Cultivation of most cash crops is labour intensive and therefore, the physical indivisibility of a person's labour dictates that a choice for its allocation has to be made, and given the range of crops, a choice is often made in favor of the perceived high value crop as opposed to household food crop production.

Production for the market is driven by the preoccupation to expand agricultural output, through adoption of more valuable crops, higher-yielding varieties and increased use of imported agricultural inputs. Accordingly, every aspect of this required increase calls for the purchase of mainly imported inputs; hence, it is not surprising that attention has been concentrated on production for the market since increased sales are required to pay for

these increased expenditures. Moreover, in the obsession to increase commodity output, smallholders are ignored since their landholdings are small and uneconomically viable.

In the 1960s up to late 80s, many African countries (Kenya included) had adopted a “master farmer” approach in channeling extension services, resources and credit to a limited number of farmers, who because of their positions, already owned more resources than the average farmer (Chung, 1992). However, he argues that such an approach favored the well-to-do and progressive farmers who were mainly engaged in non-food commercial farming; and that rarely did the expected “demonstration effect” denoted by up-take of innovations by all farmers ever resulted. In practice, such innovations are often inappropriate for the resource-poor farmers and the failure of the “trickle-down” approach in such circumstances can be mistaken for laziness and ignorance among them.

Other variety of techniques identified and are employed to expand coffee output in the short-term; includes better crop husbandry practices such as weed control, pruning crop protection techniques, plant nutrition, less intercropping and more complete harvesting (Msechu, 1979; Mwadha, 1985). However some of those practices such as pure stand coffee farming negate the objectives of crop diversification and intensification that are important among resource-constrained smallholders.

Legal provisions pertaining to coffee production are found in the Coffee Act (Cap 333 laws of Kenya). They stipulate that the government intervenes in the industry in the following major areas: (a), getting land to be under coffee; (b), control of planting materials; (c), imposition of export taxes (Price Waterhouse, 1997). It is today felt that, in enforcing “a” above, coffee production continues to be allocated the most fertile of lands while food crops are cultivated in relatively marginal and sloppy grounds. The above controls bespeak of the seriousness with which the government regards this sector. Indeed, up to mid 1990s, ideal coffee husbandry practices were stringently enforced by assistant chiefs and coffee board inspectors especially among smallholders who are prone to intercropping.

Farming systems among smallholders are profoundly affected by distant off-farm economic factors beyond their control. Adverse world market prices for agricultural commodities often lead exporting countries to emphasis on expansion of output through devotion of more acreage to the export crop. For example, due to the adverse world market prices for tea and coffee during 1999 to 2002, there has been emphasis on expansion of acreage under the affected cash crops (Kenya, 2002). This is apparently to increase their respective outputs, thereby offsetting adverse effects occasioned by declining market prices. Indeed, this is correspondingly evidenced by the observation that 65% of total farming area in Nyeri district was under cash crops has been on the increase (Nyeri District Development Plan, 1997).

Problems of resource inaccessibility among smallholders seem to discriminate on the basis of where output is destined. In a study among a group of smallholders in Zimbabwe, it is reported that credit and inputs are not availed for production of subsistence crops, apparently because it is deemed that such farmers will not earn the cash necessary to repay the crop loans; conversely, such resources are indeed extended to, among others, those smallholders engaged in maize production for the market (Zinyama, 1989). This suggests that policies on credit disbursement for agricultural improvement are discriminative on basis of destination of crop out put.

Similar findings on smallholders inability to access farm resources are by World Bank (1995).The study found that only 35% of the wealthiest smallholders benefit from increased supplies of credit, fertilizer and hybrid maize seeds in Kenya. Those statistics paint a grim picture about the unequal access to the much-needed resources essential to step up agricultural production. The general implication is that use of yield enhancing resources remains low among majority of smallholder farmers in Kenya.

Another school contends that the persistent poor performance of smallholder agriculture is due to lack of technical skills (FAO, 1993). The study argue that smallholder farmers lack data on which to base recommendations about maintaining an appropriate balance between food and cash crops, using the right seeds, applying the right dosage of fertilizers, insecticides and following recommendations of extension services such as time of planting, crop spacing among others. Indeed, it cites the above as major

technical hitches that constrains increase in food productivity among smallholder farmers. Such conclusions obviously undermine the role of farmers' indigenous knowledge on crop husbandry. Moreover, even where such innovations are disseminated, their adoption by farmers is limited; one reason commonly identified for such low uptake of technologies being their (farmers) non-participation in those formulations (Chitere, 1980; Chung, 1992).

2.5 Theoretical Framework

A theory is a statement that broadly describes or explains phenomena. The present research shall use two theories to explain the phenomena under investigation.

The of theory of Peasants and Modes of Production

This theory is mainly applied within the context of political economy. Its application here shall enhance our understanding of problems of governance in the light of attempts to control and allocate resources.

Peasants are countrymen working on the land, either for wages or on very small plots of land that they either own or rent. Boesen and Mohele (1979) argue that when capital penetrated agriculture, it destroyed pre-capitalist modes of production. Such modes of production included communal working on land, ownership of land through kinship system, communal herding of animals among other aspects of a mutual aid society (Omosa, 1998). These modes of production were destroyed, but their forms that entail households as the basic units of production and partly producing for subsistence were preserved.

Today, capital dominates agriculture in the forms of market supply and demand, marketing, credit institutions, the state and the introduction of peasant farmers into the market economy. These various representations of capital within agriculture aid in the transfer of benefits (that accrue from farmers' produce) to those who control capital and markets (Boesen and Mohele, 1979). As a result, though the peasant owns the land, he lacks control over products of his labour power and therefore is reduced to a seller of his labour power and a producer of surplus value for capital. Accordingly, the incomes that peasants earn from sale of commodities are essentially "disguised wages".

Through a variety of colonial, economic, political and administrative methods, peasants are compelled to produce commodities for the capitalist market, just to obtain items of necessary consumption in the market and to specialize in a limited range of products (Boesen and Mohele, 1979). This unequal exchange is not only between countries but also between sectors with different modes of production. This therefore implies that the state also collaborates with foreign capital in expropriating the peasantry's product. Their combined function draw peasants into capitalist markets and keep them there using a blend of economic and compulsory measures. They further argue that strong monopolies ensure that the state and foreign capital are able to convert most of surplus labour into their surplus value. In Kenya, the coffee market was until recently monopolized by the state controls. That stage represented a forum for its collaboration with foreign capital in the expropriation of surpluses that emanate from farmers' produce

The integration of Kenya's coffee growers into the world economy has been one extended process beginning in the 1890s. Coffee is a labour-intensive crop and it continues to expand among peasant producers who have few alternatives but to remain in production even at deteriorating price relations. This is because they are petty commodity producers who are only concerned with covering costs of reproduction of labour. This way exchange value of their products may fall below the cost value without forcing them out of production. This is possible because their subsistence production also subsidizes commodity production.

This theory proposes an escape mechanism from this kind of exploitation through either leaving cash crop agriculture, or withdrawing to a higher degree into subsistence production (Boesen and Mohele, 1979). However, these are not very feasible options since people's livelihoods are largely determined by the environments and resources availed to them by nature. Therefore, given land as the only resource base availed to peasants, there is need to resort to another theory to help capture the potentials and limits to farmers efforts to eke livelihoods within the social –ecological contexts in which they find themselves.

The theory of Intensification

The theory of intensification is used in the field of ecology, a field that cuts across many disciplines. Within agriculture, intensification generally refers to any practice that increase productivity per unit land area at some cost in resource inputs; and its emphasis is especially on market- bound production.

Agricultural intensification takes many dimensions such as irrigation, fertilizer application, crop rotation, mechanization, crop diversification, and cultivation of hybrid varieties, among other techniques that aim to increase yields per unit area. However, socioeconomic and ecological conditions usually set broad limits and specific forms of agricultural intensification that are adopted may often reflect adjustments made by farmers in response to various economic and social factors (see Farvar, 1976)

Ideally, cash crop cultivation could be regarded as a farming system meant to help farmers maximize returns to their productive factors land, labour and capital within the context of market production. However, resource constraints that characterize rural areas have compelled resource-poor smallholders to plan their farm activities in such a way as to optimize use of their land and other resources by simultaneously producing for household consumption and surpluses for the market. Their entry into market production has therefore compelled them to re-organize their productive factors so as to maximize returns.

Thus, according to the theory, it is the desire to optimize utilization of their resources in the face of constraints, which have impelled them to diversify their options within agriculture. Problems they encounter in their attempts to utilize their limited farm resources are as a result of broad limits set by nature; for example, land constraints ill afford farmers to leave it to fallow; on the other hand, continued cropping in such circumstances expose soils to early exhaustion, which situation can be ameliorated by use of inputs that replenish soil fertility. Inability to access such inputs restricts their agricultural productivity to very marginal levels.

2.6 Study hypotheses

This study tests the following hypotheses:

- (i) Cash crop production affects smallholders ability to be self- sufficient in food from farm production.
- (ii) Resources allocated to cash crop production affects households' food sufficiency from own farms.
- (iii) Smallholders farm management decisions are responsive to commodity output prices.

3.0 CHAPTER THREE

3.1 Methodology

This chapter briefly describes the methodology employed in conducting the study. It is organized into sections as explained below.

The researcher selected Nyeri district of Kenya purposively. It is unique in that it is predominated by smallholder farmers who both produce cash and food crops both for the market and for subsistence.

There are 4 research strategies for understanding the world: experiments, surveys, field research and the use of available data. The present study used survey research that entails application of questionnaires and interviews to a relatively large group of people. This method is used to identify presence of certain characteristics among the groups. In survey research, information is collected from a representative sample of the large group in order to make generalizations about the whole group.

3.2 Description of study site

Nyeri district is one of the six districts in central province of Kenya. It is the second largest district with an area of 3,266km².

The main physical features of the district are Mt. Kenya and Aberdare Ranges. These determine relief, climate and soils hence agricultural potential of the district.

Climate

The district experiences equatorial type of climate with two rainfall seasons. The long rains occur from March to May and short rains from October to December. Annual rainfall varies from place to place but ranges from 500mm in the Kieni Plateau to 1500 mm in the upper ridges of the mountain.

Mean annual temperatures range from 17⁰c to 28⁰c on average. Rainfall and temperatures have a strong influence on agricultural patterns in the district. Areas with moderate rainfall and temperatures grow both food and cash crops while areas with least rainfall, mainly the Kieni plateau mainly grow subsistence and draught resistant crops.

Agriculture

Agriculture is the main economic activity in the district. Smallholders account for about 78% of the district's population. Crops grown include coffee, tea, maize, beans, Irish potatoes and bananas.

Justification for selection of study site

The site was selected for the present research as it offered the conditions for food production inadequacy among smallholder farmers.

Most importantly the researcher hails from the area and therefore has considerable knowledge about its geography, socioeconomic and cultural aspects of its people. Besides, he is well versed in the local language, which came in handy in tapping information relevant to the research problem.

3.3 Operationalization of variables

Variables refer to characteristics of units that vary, taking on different values, categories or attributes for different observations. The following null hypotheses delineated variables for this study.

(i) H_0 : Cash crop production does not affect smallholders' ability to be self- sufficient in food from farm production.

Dependent variable: household food sufficiency

Indicator for dependent variable

- Household's purchases of staple food per season (measured in number of months)

Independent variable: cash crop production

Indicator for independent variable

- Respondent's proportion of total land under coffee

(ii) H_0 : Resources allocated to cash crop production do not affect household's food sufficiency.

Dependent variable: household food sufficiency

Indicator for dependent variable

- Household's purchases of staple food per season (measured in number of months)

Independent variable: resource allocation

Indicators of independent variable

- Fertilizer application on coffee crops (measured in the number of 50kg bags used)
- Available household labour resources from present members (denoted by its adequacy in coping with farm activities for cash and food crops combined)

(iii) **H₀** : Smallholders' farm management decisions do not respond to commodity output prices.

Dependent variable: Farm management decisions

Indicator of dependent variable

- Farmer's adjustments of their coffee crop acreages between the period 1995 to 2004.

Independent variable: commodity output prices

Indicators for the independent variable

- Indices of coffee payments (per kg) received by farmers during the period from 1995 to 2004.

3.4 Unit of analysis

Unit of analysis refer to the entities / objects / events under study; or generally what is to be described or analyzed in a study. For the present study, the unit of analysis was small-scale farmer households.

3.5 Unit of observation

The unit of observation refers to the people or respondents in the process of data collection. Smallholder farmers (household heads) were the major source of information for the present study. However, other key informants were drawn from farmer institutions like KPCU, coffee farmers co-operative societies and district agriculture offices. Respondents were selected as described in the following section.

Table i: Administrative and demographic structure of Nyeri District.

Divisions	Locations	Population (000)	No of sub locations
Kieni East	4	101	14
Kieni West	5	72	20
Mathira	7	494	41
Mukurweini	6	650	27
Municipality	2	721	22
Othaya	4	656	28
Tetu	6	384	38

(Source: Nyeri District Development Plan 1997)

3.6 Sampling design

Sampling design refers to that part of the research plan that indicates how cases are to be selected for observation. This research adopted probability sampling combined with non-probability techniques.

Sampling of households

Three divisions that best captured sample variations were purposively selected for this study. According to Singleton (1988), purposive sampling is a general strategy to identify important sources of variations in the population and then selecting of sample that reflects those variations. The advantage of purposive sampling was that cost of field work was minimized because samples were not scattered out spatially. The researcher identified important sources of variations in the population and then purposively selected a sample that reflected those variations. The researcher had considerable knowledge about the district and its population characteristics to enable him draw the primary sampling units. The key variations employed in the selection process were population density, average size of land holdings and prevalence of food / coffee farming within sample divisions. Mukurweini, Othaya and Municipality divisions were selected according to the above criteria.

The above administrative units were treated as clusters from where multistage probability sampling was done. Multistage sampling refers to situations where there is any sub-sampling within the clusters chosen within the first stage. It entails sampling in stages of more than once. The advantage of cluster sampling is that travel costs are minimal since interviews are not over dispersed localities and it does not involve the listing of all population elements under study.

In order to arrive at a representative sample, sampling was done in two stages. These stages aimed at getting the secondary sampling units (locations and sub locations) from within the respective clusters. For every cluster (division), numbers for locations were written down on chits of papers, which were then folded and randomized before being subjected to the rotary method of case selection. One case per cluster was selected.

The second stage aimed at drawing sub-locations from the 3 selected locations. Numbers for the sub locations (per selected location) were again written on chits of papers; these were folded and randomized before random selection of one case per sampled location.

A sub-sample of 25 households from each of the 3 sub-locations was drawn to form a sample of 75 respondents. Lists of households and land holdings per sample sub-locations were from obtained respective sub-chiefs.

3.7 Sources of data

The following methods of primary data collection were adopted:

- (a) **structured interviews** : these interviews were held face-to-face between the researcher and the sample respondents at house-hold level. They were carried out using standardized questionnaires. This method was preferred due to its high response rate. This research used the face-to-face interview method of data collection since the researcher intended to benefit from non-participant observation in the fields. Questions were framed in relation to the study hypotheses and research themes.
- (b) **Focus group discussions - (FGDs)** : during the structured interview stage, knowledgeable participants were purposively selected to be participants in the FGDs. 2 FGDs of 8 people each were selected. Discussions were guided by use of a schedule containing open-ended questions. Aim of those discussions was to elicit greater details that could not have been captured during the face-to- face interviews
- (c) **Key informant interviews**: key informants were selected for interviewing as follows:
 - 1 key informant from KPCU was interviewed. This organization is in charge of milling and marketing of coffee in Kenya. The researcher sought to get information about local processing of coffee, marketing channels, determination of coffee prices and other dynamics surrounding the coffee industry locally and internationally.
 - 6 key informants from Coffee Farmer Co-operative Societies were interviewed (2 informants each from each of the 3 co-operative societies from which respondents were drawn). The researcher sought information about services rendered to farmers, operations of co-operative societies, determination of prices payable to farmers, and issues of efficiency in service delivery.

- 2 key informants from the district agriculture offices were also interviewed.

The focus group and key informant interviews helped gather qualitative information on cash crop, food production and household food sufficiency. These discussions as earlier stated were guided by interview guides that addressed the research themes.

- (d) **Observation:** The researcher while in the field observed aspects to do with farming systems practiced by households.

Secondary sources of data

Documented reports obtained from books, journal articles, government documents, periodicals, grey literature, newspapers, production reports among other credible sources of information were used in the design of this study and also in the interpretation of findings. These sources are acknowledged

3.8 Methods of Data Analysis

These include procedures for making sense of the raw data. The collected data called for systematic organization, interpretation and presentation. The researcher made use of descriptive and inferential statistics to make sense of the raw data.

Data were mutually coded and analyzed using descriptive statistics - mean, mode, percentages and tables were used in the organization, summary and presentation of data. These were complemented by a measure of variability (standard deviation) to make the discussions more elaborate.

This study employed inferential statistics to search for relationships in the non-parametric data. The concern among sociologists is developing generalizations about social behavior. Thus, when working with sample data, the interest is inherently on the populations they represent rather than the samples themselves. Inferential statistics in such a case enables a researcher to make an inferential leap from the sample to the population of study.

Inductive statistical techniques (chi-square and contingency coefficient) were used in the search for relationships among variables. These statistical methods require that samples must have been randomly selected for purposes of representativeness. Chi-square

statistic was employed in the search for relationships among variables identified in the study. This statistical tool was used to measure how closely related observed distributions approximated the expected distributions. It was derived using the formulae:

$$\chi^2 = \frac{\sum(O - E)^2}{E}$$

Where O = observed frequency in each distribution,
 E = expected frequency in each cell

The calculated chi-square values were then compared with critical values generated from chi-square tables using the formulae $(n_r - 1)(n_c - 1)$ to determine the degrees of freedom,

Where: $(n_r - 1)$ = number of rows less one,
 $(n_c - 1)$ = number of columns less one

The 95% confidence limit was used as the standard for deciding whether to accept or reject the null hypotheses. If the calculated chi-square was found to be higher than the critical chi-square, then this indicated presence of a significant relationship between variables. However, if the calculated chi-square was found to be lower than the critical chi-square, then this indicated absence of a significant relationship between variables.

However, chi-square statistic has one limitation in that it does not indicate the strength of relationship observed between variables. As such, this study applied the contingency coefficient statistic to test the strength of association between variables but only where chi-square tables were of same the dimensions. The following formulae was used:

$$C = \sqrt{[X^2 / (X^2 + n)]}$$

Where: C = contingency coefficient,
 X^2 = calculated chi- square value
 n = sample size

Contingency coefficient values range in a continuum between zero and < 1 ; where a value of zero denotes no association; and values of 1 denote perfect association.

The above procedures were used in data presentation and analysis.

3.9 Work Plan

Pretesting of data collection tools	(1 week)
Data collection	(3 weeks)
Data analysis	(3 weeks)
Report writing	(4 weeks)

4.0 CHAPTER FOUR

4.1 DATA PRESENTATION

This section presents and discusses the findings of the study using descriptive statistics. Descriptive statistics are tools involved in describing collections of statistical observations whether they are samples or total populations. Such descriptive statistics employed here includes the mean and the mode. These are complemented by the use of standard deviation, which is a measure of variability that measures the spread of scores in a frequency distribution. Simple tables and percentages are also used to make the discussions more elaborate.

Statistical sample for this study consisted of 75 respondents. These were smallholder household heads engaged in cultivation of both coffee and food crops and were active members of coffee cooperative societies. The sample consisted of those household heads who had mature and producing coffee trees and had continuously cultivated both coffee and food crops for the 5 years that preceded the interview. They were drawn from divisions typical of small-scale coffee and food farming in Nyeri district. The sample selection procedure is fully discussed in the previous chapter on the whole methodology of the research design.

4.1.1 Social and demographic characteristics of respondents

Besides the study sample having singular interests in cultivation of food and cash crops, they varied on a number of characteristics as presented below.

Table 1: Distribution of sampled household heads

Category	Frequency	% frequency
Male	46	61.3
Female	29	38.7
Total	75	100%

The data collected revealed that most household heads were males (61.3%) as opposed to females who were 38.7% of the total sample.

Age is an important factor in farming as it influences agronomic practices adopted by farmers (Obara, 1983). For example, young farmers are energetic and known to readily adopt modern methods of farming, while older farmers tend to retain the traditional methods of cropping and are less energetic. The importance of age therefore impelled

the researcher to determine the ages of household heads. Respondents were asked to state their age in years and their responses are summarized below.

Table 2: Distribution of household heads by age

Age	Frequency	% frequency	Cumulative frequency
20- 29	3	4	4
30- 39	19	25.3	29.3
40- 49	15	20	49.4
50- 59	17	22.7	72.1
60- 69	13	17.3	89.4
70 and over	8	10.7	100
Total	75	100	

The mean age of respondents was 50.6 years with a mode of 37.5 years. The oldest and the youngest respondents were 84 years and 26 years respectively, reflecting a range of 58 years. Majority of respondents (25.3%) were in their early midyears of 30 – 39, a minority (4%) were below the age of 30. However, 7 of the respondents could not tell their exact ages, but the researcher approximated them to be over 70 years since they all conceded to have been of marriageable ages (18 years) at the height of independence struggles in 1952.

In general, 29.3% of respondents were below the age of 40, compared to 50.7% who were over 50 years old. The findings revealed dominance of an ageing population within the rural agricultural households; this could be due to out-migration of young able-bodied population to urban areas in search of better opportunities outside the farms

The other implication of age structure of farm household heads is its determination of size of household labour available and even the potential supply of labour. Labour is an important component in the analysis of smallholder agriculture. Also important is how the household's agricultural output is distributed or utilized for the reproduction of its own labour power. It was therefore deemed necessary to determine the size of households by members who were present. Respondents were asked to state the number of household members who regularly lived and ate from their households for the four months prior to the interview.

Table 3: Distribution of respondents by present number of household members

Number of persons	Frequency	% Frequency	Cumulative Frequency
1-2	13	17.3	17.3
3-4	27	36	53.3
5-6	23	30.7	84
7-8	8	10.7	94.7
9 and over	4	5.3	100
Total	75	100	100

Majority of households (36%) had 3 to 4 members. Only 5.3% of the households had over 9 present members; 17.3% of the households had 1- 2 persons, 66.7% households had between 3-6 members.

Level of education is another characteristic that influence people's occupations and their adaptability to new innovations within those occupations. Respondents were therefore asked to state the level of education attained and their responses are summarized below.

Table 4: Distribution of respondents by levels of education

Class	Frequency	% frequency	Cumulative frequency
No schooling	12	16	16
Primary 1-4	15	20	36
Primary 5-8	24	32	68
Secondary 1-2	11	14.7	82.7
Secondary 3-4	9	12	94.7
A-level (5-6)	1	1.3	96
Post secondary	3	4	100
Total	75	100	

Findings revealed that 16 % respondents did not acquire formal education, majority reached (32%) standard 5 to 8; 1.3% had A- level education, while only 4% had tertiary-level education. In general, 68% of respondents had little (primary) or no education, 28% had average (secondary) education, while only 4% had acquired higher education.

Rural households are complex economic units engaged in diverse activities to meet their economic needs. The analysis of how they make their livelihoods is problematic bearing in mind the many components, which summed make up their livelihoods. However, that obstacle was overcome by treating as single entities those major occupations that made

up rural farmers' livelihoods. Thus, main occupation is used to denote the activities that engaged most of respondents' time on a day-to-day basis. Respondents were thus asked to state their main economic occupations and their responses are tabulated below.

Table 5: Distribution of respondents by main occupations

Occupation	Frequency	% Frequency
Farming	47	62.7
Agricultural wage labour	4	5.3
Non-agricultural wage labour	11	14.7
Formal employment	7	9.3
Small scale business	6	8
Total	75	100

Survey findings revealed that 62.7% of respondents were engaged in cultivation of their own farms. A minority were (5.3%) agricultural wage laborers - most likely because their parcels of land were too tiny to keep them engaged and supplied with food throughout the season; 14.7% of respondents were in off-farm wage labour, 8% run small scale businesses, while 9.3% were in formal employment. Findings thus revealed that farming occupied the center stage in the livelihoods of majority of small-scale farmers.

4.1.2 LAND USE

Having looked at the household characteristics, this section examines how utilization of household resources affected their food sufficiency position. Land size is an important variable in the understanding of smallholder agriculture as earlier argued in chapter two of the study. It influences the absolute quantities of inputs and their mix ratios, which are in turn important determinants of levels of output. Effort is therefore made to determine how land was distributed among the sample population. It emerged that a number of respondents had hired some parcels of land for cultivation from other landowners to supplement output from their farms. Those respondents who were in such land tenancy agreements for the two years that preceded the interview were included in the sample. This is because it was deemed essential to account for all the respondents' food output from their holdings. Respondents were asked to state their total land holdings including rented parcels. Their responses are tabulated in the table below:

Table 6: Distribution of respondents by total land holdings

Land size (acres)	Frequency	Relative frequency
Below 1	12	16.0
1 - < 1.5	20	26.7
1.5 - < 2	14	18.7
2 - < 2.5	11	14.7
2.5 - < 3	8	10.7
3 and above	10	13.8
Total	75	100

From the survey findings majority of respondents (26.7%) had 1 to 1.5 acres of land; 16 % of respondents had up to 1 acre; while only 13.8 % had over 3 acres of land. The mean land size was 1.9 acres with a mode of 1.1 acres and standard deviation of 1.01.

As stated earlier, coffee is a perennial crop, which upon maturity can remain productive for more than 15 years with proper tending. When old and unproductive, the stems can be cut to allow younger ones to regenerate from the same stock base. This way, farmers are able to maintain a stable acreage of their land holding under coffee - alteration to such holdings only being feasible either through uprooting part or all of the coffee bushes or planting additional bushes. This is unlike acreage under food crops that can fluctuate seasonally due to a combination of factors as weather, variation in quantities of inputs used, land left to fallow among others. The following is an examination into how respondents allocated their land between food and cash crop. Respondents were asked to state proportion of their total land that were under food and cash crops respectively and their responses are summarized below:

Table 7: Distribution of respondents by proportion of land under food and cash crops

Proportion of respondent's total land	Food crops		Cash crops	
	Frequency	Relative frequency	Frequency	Relative frequency
Up to 0.25	15	20	11	14.7
0.25-<0.5	42	56	38	50.7
0.5-<0.75	16	21.3	21	28
Over 0.75	2	2.7	5	6.7
Total	75	100	75	100

Findings revealed that majority of respondents (56%) had between 0.25 and 0.5 of their total land under food crops, only 2.7% of them had over $\frac{3}{4}$ of their land under food crops. On the other hand, 50.7% of the respondents had between 0.25 to 0.5 of their land under coffee and 6.7% of respondents had over $\frac{3}{4}$ of their land under coffee.

Coffee is regarded as more valuable than food crops; but mainly respondents' conviction was based on past performance of the coffee sector. For example, a respondent quipped, "here, food production has always been for household consumption, we therefore do not place much premium on it like we do on coffee. Most families educated their children on proceeds from coffee in the 1970s up to late 80s". They however generally conceded that cost of living index was lower then. As such, it logically follows that coffee incomes, low as they were, commanded larger bundles of goods then, than they would today. The researcher concluded that although coffee incomes have risen slightly since then, the rise in cost of living index has by far outstripped any benefits that would accrue from the increases in coffee incomes, and this has affected farmers' purchasing power adversely. Hindsight about such realities have rendered many farmers fixated on the crop's absolute valuability and this might explain the observed allocation of more land resources to it at the expense of food crops. The implication is that despite food sufficiency being a central issue among farmers' livelihoods, they accorded higher priority in land use to cash crop cultivation at the expense of food crops.

Having examined how individuals allocated their land between food and cash crops, the following is a summation of sample respondents' total land under cash crop and food crops respectively.

Table 8: Respondents' aggregate land to coffee and food crops

Land use	Acreage	Percentage frequency
Coffee	64.9	45.1
Food crops	58.1	40.4
Others	20.7	14.5
Total	143.8	100.0

The findings revealed that 45.1% of land held by the sample population was devoted to cash crop production compared to 40.4% land to food crops; only 14.5% of the land was devoted to other uses like pasture, trees, homesteads among others.

4.1.3 FOOD SUFFICIENCY

Having looked at how farmers allocated their land resources between cash crops and food crops, this section seeks to investigate the range of food crops that farmers cultivated. This is important in the light of the study's contention that households sought sufficiency in food from on-farm production. Respondents were thus asked to list the food crops that they grew in their farms.

Table 9: Distribution of respondents by range of food crops cultivated

Crops	Frequency	% Frequency
Maize, beans	6	8
Maize, potatoes	4	5.3
Maize, beans, potatoes, vegetables	13	17.3
Maize, beans, bananas	8	10.7
Maize, beans, sweet potatoes	9	12
Maize, potatoes, vegetables, bananas	11	14.7
Maize, potatoes, vegetables, sweet potatoes	9	12
Maize, beans, potatoes, bananas, sweet potatoes,	15	20
Total	75	100

Findings revealed that the most popular crop combination was maize, beans, potatoes, bananas and sweet potatoes that were cultivated by 20% of respondents. Only few respondents (8%) reported to cultivate maize and beans only. It is observed that all respondents grew maize, hence the study's conclusion that it constituted the district's staple.

After examining the range of food crops that farmers cultivated, this part is devoted to examining the yields that accrued from the apparent major crops cultivated by respondents. This was deemed essential in the light of the study's postulation that competing land use patterns among farm households can affect land available for food crop production. Respondents were thus asked to state the quantities of shelled maize, threshed beans and potatoes that they realized during the harvest season prior to the interview; responses are tabulated in the table below

Table 10: Distribution of respondents by quantities of maize yields

Maize output (90 kg bags)	Frequency	Percentage frequency
1	18	26.1
2	26	37.7
3	11	15.9
4	7	10.1
5 and above	7	12.2
Total	69	100

Findings revealed that 6 respondents reported not to have realized any yields at harvest time. Majority (37.7%) reported to have harvested two bagfuls of maize, followed by another 26% who realized one bagful, only a small proportion of respondents (12.2%) had realized 5 bagfuls and above. The mean yield was 3.02 bags with a standard deviation of 0.09.

The researcher gathered that the low maize output among respondents was attributed to lack of yield-enhancing inputs. Some respondents reported that they routinely used part of their maize crop as seed inputs during a subsequent planting season. For example, “since I often don’t have money, I rarely use fertilizers when planting” was a characteristic response among many. Others reported purchasing maize seeds from merchant stores; moreover, they could not vouch for the seeds’ quality. Respondents were therefore found to lack in technical knowledge on the quality and variety of maize seed inputs suitable for their farms during different seasons.

Nonetheless, among those who accessed inputs from their coffee co-operatives for use on coffee crops, majority of them reported dividing their use between coffee and maize. A respondent elaborated, “cost of inputs have risen, the little that most farmers get on credit from their coffee co-operatives is therefore apportioned between the cash crops and food crops”. Since chemical fertilizers are formulated for specific crops, their application to other crops might not lead to the desired effects. Such lack of proper inputs and technical skills on their use could have contributed to the observed low maize crop yields.

Table 11: Distribution of respondents by quantities of beans

Beans output (kg)	Frequency	Percentage frequency
No reported harvest	24	34.7
Up to 20	20	29.0
21- 40	13	18.8
41-60	4	5.8
61 and above	8	11.7
Total	69	100.0

Survey findings revealed that 6 respondents had not planted beans. Of those who had planted, 34.7% did not record any harvest either as a result of having appropriated it while green in the fields and/ or crop failure; 29% of respondents realized up to 20kg of beans, closely followed by another 18.8% who realized between 21 to 40 kgs. Only 11.7% of respondents had realized more than 41kg of beans.

Table 12. Distribution of respondents by quantities of Irish potato yields

Potato output (110 kg bag)	Frequency	% Frequency
No output reported	16	22.5
1	22	31.0
2	13	18.3
3	7	9.9
4	5	7.0
5 and above	8	11.2
Total	71	100.0

Survey findings revealed that only 4 of the respondents had not planted potatoes. However, of those who had planted, 22.5% did not report any output - either as a result of crop failure and / or having appropriated all of it while green in the fields. Majority of respondents (31%) had harvested up to one bag closely followed by 18.3% who reported a yield of 2 bags. Only 11.2% of respondents had over 5 bags of the crop. Besides being an essential source of roughages, potatoes are also an important source of carbohydrates. It is then apparent that majority of respondents had low or potato yields and therefore it is likely they did not adequately meet essential caloric requirements.

There are 3 major process identified by which households can dispose of their food crops output. These are: (i) sale of food in the market in exchange for cash or some other commodities, (ii) household (subsistence) consumption and, (iii) social safety nets, in which case households when they have depleted their food reserves can for example turn to their kin or friends for assistance (Omosa, 1998). Though many households sell a

portion of their food crop yields in the market, it is widely reckoned that such quantities sold rarely constitute surpluses from household production. Rather, the necessity to raise some cash to purchase other items of necessary consumption such as salt, tea leaves, paraffin etc, is what impel households to sell part of their food crop stocks (Omosa, 1998) .In this sense, food crop stocks become useful to households to the extent that they mediate in the access to other bundles of consumption products. Therefore, in food crop dwells the potential of “exchange value” that is inherent in commodities like cash crops. However, since market participation for both food and cash crops is quiet limited in scale, smallholder farmers are said to be simple commodity producers meaning that they produce for their subsistence and some little for the market (Boesen and Mohele, 1979).

In the light of the above, an examination of absolute on-farm food yields (tables 10-12) cannot be complete without examining how households disposed of their food outputs. Towards this end, this section seeks to examine the number of meals that households had in a day:

Table 13: **Distribution of respondents by number of meals per day**

No of meals	Frequency	Percentage frequency
1	5	6.7
2	37	49.3
3 and above	33	44
Total	75	100

The findings revealed that 6.7% of households had only one meal in a day, 44% had 3 or more meals, while close to about ½ of households had two meals in a day .In general 56% of households had one or two meals in a day. The findings therefore depict prevalence of ‘hidden’ hunger among respondents. However, reliance on data for number of meals partaken can to an extent be misleading as a measure for household food sufficiency; for example, households can voluntarily alter their consumption bundles either to “artificially” prolong the staple reserves or for reasons as having to work away from their homes during the day.

To overcome inadequacy of findings presented in the table above, respondents were asked to state if they had run out of staple food supplies during the season prior to the

interview. This was meant to assess their capacity of food sufficiency in staple food. Findings revealed that majority (85.3%) had exhausted their staple food stocks during the period under investigation, with only 14.7% admitting not having depleted their staple food reserves during the same period. Of those who had depleted their staple reserves, 14.31% of them said they did not resort to the purchase of staples from the markets while the rest (85.69 %) admitted to have resorted to the markets to bridge gaps in their household staple food requirements during the period under investigation.

The above findings necessitated an examination of months of the season in which hunger was mostly concentrated. This was also aimed at bringing out the duration (length of time) that staple food stocks lasted during post-harvest period. Respondents who resorted to markets to bridge deficits in staple food requirements were asked to state the number of months they had purchased food in the markets during the season prior to the interview. Their responses are summarized in the table below:

Table 14: Distribution of maize purchases for consumption by months of the season

Duration of season	Frequency	% Frequency	Cumulative frequency
First month	4	7.8	7.8
Second month	8	15.7	23.5
Third month	6	11.8	35.3
Fourth month	9	17.6	52.9
Fifth month	11	21.6	74.5
Sixth month	13	25.5	100.0
Total	51	100.0	

Findings reveal that during the first post-harvest month, 7.8% of respondents had depleted their food stocks had already resorted to markets for their food needs, and by the second month the proportion had tripled to 23.5%. By the fourth month 52.9 % of respondents were reliant on markets for their basic food requirements. In the 5th and 6th months of the season alone, 47. 1% of respondents were reliant on markets for their staple food requirements.

It is recognized that household's degree of sufficiency in staples can be affected by other processes earlier on identified as avenues by which households can dispose of their food crop stock. Though this study did not examine how interventions based on mutual assistance relationships could impact on household food stocks; some scholars have

nevertheless argued that the introduction of peasant farmers into the exchange economy led to erosion of the strong social ties that held traditional societies and families. As a result, in their production and consumption processes, individual family units tend to be “atomistic”, meaning that they seek to be self- reliant and operate in relative isolation from their extended families (Bulow et.al, 1998; Mackenzie, 1992). Therefore, this study assumes that household food transfers cannot fundamentally affect their sufficiency positions as subsistence consumption and food sales would.

Therefore concentration here is on other processes by which household food reserves are consumed. Attempt was made to measure how sale of food stocks in the market affected household's sufficiency. Since it is recognized that most farmers sell at least a small portion of their food crop outputs (in cash or kind) in order to access other items of consumption, those who were included as participating in market transactions were only those who had sold more than 2 *debes* of their maize (focus here was on the 2nd last harvest prior to the interview). Such sales were deemed to have had the potential to affect their food sufficiency positions in the course of the season. Respondents were asked to state whether or not they had sold two or more *debes* (it is a 20kg container) of their maize crop stocks in the course of the season under investigation. Their responses are tabulated below.

Table 15: Distribution of respondents by sale of staple food in the market

Response	Frequency	Relative frequency
Yes	9	12%
No	66	88%
Total	75	100%

Findings reveal that only 12% of respondents sold part of their maize yields in the market, the rest (88%) did not . However, even among all those who made sales, none sold their produce through the “official” market channels i.e. the National Cereals and Produce Board, but rather sold through “unofficial” market channels.

4.1.4 FACTOR ALLOCATION

The present study's contention is that introduction of cash crops among smallholder farmers has impinged on factors such as land (as revealed by findings from tables 8 and 9), labour and inputs. Mwandihl (1985) has argued that with such an introduction,

farmers should be able to produce even greater quantities of food on smaller areas of land. Such would arise from increased profitability of land, which he views as likely to result in more intense cultivation and modern farming methods to boost production. However, it is also likely that farmers could make evaluations about what is more valuable (between food and cash crops) thereby favoring cultivation of the valuable crop to the exclusion of the other.

According to Cleave (1974), the advent of a capitalist economy on a predominantly subsistence economy tends to change a household's operations as production is geared more towards satisfying needs of capital for surplus value and less to satisfying family subsistence needs. This alienation of household focus from subsistence to market production is even likely to be enhanced by variation in their relative values. Such differences are bound to be reflected on how land, labour and inputs are utilized between subsistence ad market productions.

As earlier discussed in chapter 2, Oyugi (1984) postulates that introduction of cash crops can enhance the value of family farm production. The resulting attractiveness and valuability can consequently bring more factors into production. This is implied to lead to generation of higher returns that in turn can elevate the inputs purchased into food production thus stepping up production on both ends. To clarify on those issues of degree of land intensification, this section examines data on how other productive factors were allocated between food and cash crops. It is recognized that use of chemical fertilizers by farmers can lead to great improvement in their agricultural practices especially because of shrinking acreage occasioned by sub- division of land. On fertilizer application, respondents were asked to state if they had used any and on which crops during the season prior to the interview.

Table 16: **Distribution of respondents by application of fertilizer to crops**

Crop	Frequency	Percentage frequency
Coffee	30	44.1
Maize	31	45.6
Potatoes	5	7.4
Others	3	4.4
Total	68	101.47

From the findings, it emerge that close to a half (44.1%) of all respondents who used fertilizers applied them on coffee crops. A higher proportion of respondents (45.6%) also used it on maize; a smaller proportion (4.4%) of respondents was found to apply them to other crops.

As mentioned earlier, interviews revealed that the major impediment to fertilizer use was its prohibitive cost. However, the cost element did not seem to be an overriding factor among those who acquired it from their coffee co-operatives. They found it convenient to acquire this input on credit with its cost plus some little interest being deductible from their accounts when coffee payments became due. An assessment of other inputs stocked by the coffee co-operatives revealed chemical sprays for coffee, wheelbarrows and knap-sac sprayers. They therefore lacked inputs that could be extended to farmers for use in food crop production.

Unabated prevalence of pests may cause havoc to agricultural enterprises. It is perceived that application of pesticides is an effective method to combat effects of pests on crops. Respondents were therefore asked if they did apply pesticides to crops in the course the season prior to the interview.

Table 17: Distribution of respondents by application of pesticides

Crop	Frequency	Percentage frequency
Coffee	21	53.9
Maize	13	33.3
Others	5	12.9
Total	39	100

The survey reveals that only about a half of all respondents had applied pesticides to crops. Of those who applied pesticides, 53.9% did so to coffee crops, only 33.3% applied pesticides to maize crops; 12.9% applied pesticides to other crops.

This study contended that smallholder farmers have access to limited land and other resources. Because they are encouraged to specialize in production for the market, their agriculture is therefore not adequately diversified to meet their own subsistence requirements. This section seeks to examine the farming systems farmers adopted in

their food and cash crop plots; this is intended to indicate extent of land intensification with respect to both.

Table 18: Distribution of respondents by farming patterns adopted (cash and food crops)

Farming system	Cash crops		Food crops	
	Frequency	% Frequency	Frequency	% Frequency
Mono cropping	57	76	10	13.3
Intercropping	18	24	58	77.3
Others	0	0	7	9.4
Total	75	100	75	100

Findings revealed that 76% of respondents practiced monocropping within their coffee plots as compared to 13.1% who did the same in their food crop plots; 24% practiced intercropping within coffee plots, while the corresponding proportion for food crops was 77.3%. Therefore, land use was more intensified within food crop plots than within coffee plots. Earlier findings (table 8 & 9) revealed that most land resources were devoted to cash crop production. In the light of the above, approximately half of the land at the disposal of farmers in the study areas was therefore not intensively cultivated. It is likely that the observed low food crop output among households arose partly from that.

Other details that emerged from the interviews indicate that the practice of mixed cropping within food crop plots is popular. Respondents revealed that the practice ensure efficient and equitable utilization of scarce labour resources over the various crops. The practice is also valued as the variety of food crops forms canopies that suppress growth of weeds. It is also a valuable practice in that it enables sequential harvesting of crops and this ensures that no part of land is left idle in the course of the season. The major confluence of opinion however seemed to be that, intercropping offers an insurance of some kind in that it averts the risk of total crop loss.

Despite the highlighted merits, discussions with district agricultural officers revealed that such (intercropping) a farming system is traditional and not in their district agricultural development agenda. Likewise, in our discussions, a coffee co-operative manager was emphatic "coffee co-operatives do not allow farmers to introduce other crops within coffee plots". Indeed, their field inspectors only concern themselves with coffee husbandry. From those discussions, there lack evidence to suggest that any attempts

are made to modify agricultural extension approaches from mono-crop focus to mixed/ inter-crop farming system as to accommodate majority of smallholders are prone to intercropping. Those findings inform the conclusion that the vast of smallholders remain untouched by programs of modern agricultural development that are implemented through policies of formal institutions.

From literature reviewed the researcher has demonstrated that national policies on resource allocation are skewed in favour of other sectors at the expense of agriculture. The meagre resources to agriculture therefore downplay the pivotal role that it plays in the national economy. This study contend that of those allocations to agriculture, a disproportionate amount goes to support the export / cash crop sector at the expense of food crop sector. Since such allocations are made through extensions, research, farmer training programs among others, it is essential to examine how those allocations to agriculture are expended between cash and food crop sectors respectively. Data on number of contacts (through farm visits, seminars, demonstrations etc) that respondents had had with extension agents during the previous two seasons (one year) prior to the interview were collected for cash and food crops respectively.

Table 19: **Distribution of respondents by number of contacts with extension agents**

Number of contacts	Coffee crops		Food crops	
	Frequency	% Frequency	Frequency	% Frequency
None	57	76	69	92
1	14	18.7	5	6.7
2 or more	4	5.3	1	1.3
Total	75	100	75	100

Findings revealed that 18.7% of respondents had at least one contact with extension agents with respect to cash crops, while the corresponding proportion with respect to food crops was only 6.7%; 5.3% had two or more contacts with respect to cash crops and the corresponding proportion for food crops was only 1.3%. In general, ¼ of respondents had some contact with extension personnel with respect to cash crops while only approximately 1/10 of respondents had some contact with respect to food crops. The implication is that problems compounding food production inadequacy also emanate from outside the farm households; for instance, problems like meagre acreages among

farmers could be tackled by advising on more intensive land use practices. Therefore, with adequate support by relevant actors, problems of low food crop output and hunger among smallholder farmers could be ameliorated.

Evidence from interviews reinforced the above findings that contacts with extension agents were rare; moreover, on the few occasions that they did, attention was predominantly on cash crops. For instance, "it is many years since an agricultural officer visited my farm"- was a typical response. Other respondents revealed that though they had received advice from the agents about improvement of food crop production, their ability to implement such had been very limited. This is because such implementation calls for the purchase of a variety of inputs to be applied during planting and other subsequent stages of plant growth cycle. Financial constraint was cited as the major obstacle to uptake of such advice.

Respondents also revealed there were no other forums from where they could learn skills on how to improve their agriculture apart from the annual district agricultural shows, which many respondents said they rarely attended. It is therefore evident that lack of advice from extension agents, and for that matter, advice suitable within smallholders' resource contexts, has contributed to the poor performance of their agriculture.

Smallholder agriculture in the district of study is predominantly labour intensive. The virtual absence of any form of mechanization is most likely because of prohibitive costs and the small land sizes could are not amenable to mechanization profitably. Indeed, Lwechungura (1980) observed from micro-level farm surveys carried out, that farmers expressed shortage of labour as the most serious constraint to production. This is contrary to the postulate of a general existence of surplus labour in developing nations. In the above light households labour constraints with regard to agricultural production is examined. First, respondents were asked that should they have relied on the labour of present household members only, would they have successfully managed to cope with their farm activities in the season prior to the interview. In consideration here was also the time available to each present household member for farm activities if they were engaged in other activities off the farm.

Table 20: Adequacy of labour supply from present members in coping with farm activities

Labour supply	Frequency	Percentage frequency
Inadequate	53	70.7
Adequate	22	29.3
Total	75	100

Findings reveal that 70.7% of the respondents felt they did not have the capacity to cope with farm activities from their available stock of household labour; only 29.3% felt their household labour was enough to perform farm activities. This finding confirmed conclusions by Lwechungura (1980) that farm households suffer from serious labour constraints. It is thus likely that labour constraints contribute to the observed low food crop yields in the district of study.

Having examined the respondents' perception of their household labour adequacy in meeting labour power requirements of their farms, the proceeding section examines how households augmented their stock of household labour for farm activities. Responses are tabulated below

Table 21: Distribution of respondents by use of hired and communal labour

Frequency of use of labour from outside the household	Hired labour		Communal labour		Summation of hired and communal	
	Frequency	% frequency	Frequency	% frequency	Frequency	% frequency
Rarely	5	21.7	3	60	8	28.6
Sometimes	10	43.5	2	40	12	42.9
Often	5	21.7	0	0	5	17.9
Always	3	13.0	0	0	3	10.7
Total	23	99.9	5	100	28	100.1

Findings revealed that only 10.7% of respondents augmented their household labour with labour from some external sources all the times, 17.9% made use of such labour often, 42.9% made use of it sometimes and 28.6% rarely made use of labour from external sources. In sum the respondents who made use of labour from external sources comprised 37.33% of total the sample population (75); and of all the respondents who stated that their household labour supply was inadequate for farm operations (table 20), only 52.8% of them resorted to sourcing labour from external to the household. It is

therefore likely that pressure to produce products for both cash and subsistence purposes have some effects on farm operations. For example, such pressure might compel a farmer to make certain decisions with regard to proportions in which to deploy available labour in meeting labour requirements of the crops at a given time. Such labour allocation decisions are likely to be ultimately reflected in the respective crop outputs.

In the district of study smallholder farmers base their farming activities/ calendar on rainfall patterns. Therefore, farm activities in which farm households engaged tend to follow the same routine sequence from one season to the other. Such form of rain-fed agriculture has been identified as the major cause of labour bottlenecks at peak times of the season (Obara, 1983). The following section examines the crop calendar for selected crops within the span of two seasons (1 calendar year); the objective was to examine if farm activities for the various crops overlapped and if such exerted pressure on labour resources.

Table 22: Cropping calendar for selected crops

Crop		March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Coffee	1 st season	Land preparation		Weeding						Harvesting			
	2 nd season		Harvesting					Land preparation		Weeding			
Maize	1 st season	Land preparation	planting	Weeding				Harvesting					
	2 nd season							Land preparation	planting	Weeding			Harvesting
Beans	1 st season	Land preparation	Planting	Weeding	Harvesting								
	2 nd season							Land preparation	planting	Weeding	Harvesting		
Potato	1 st season	Land preparation	planting	Weeding	Harvesting								
	2 nd season							Land preparation	planting	Weeding	Harvesting		

(Source: field survey 2004)

The researcher gathered that the active farming activity begins in the month of March when land preparations for crops take place. Planting of food crops take place with the onset of the long rains (April – May). Due to the growth of weeds after the long rains, months of May to early June are utilized for intensive weeding. During the same period (April to June), the coffee crop that matures late has this time ripened and ready for picking, obviously due to the catalyst effect of the long rains

Respondents intimated that coffee harvesting is a labour intensive activity. This is because ripened cherries are susceptible to deteriorate in quality with passage of time; as a result, farmers who lack manpower commensurate with labour requirements of such period often concentrate available household labour to coffee harvesting. Noteworthy is that planting and weeding of food crops also fall within this period. The latter activities are crucial in that, timely planting ensures that by the end of long rains, food crops are at stage of growth where they can withstand the impending drier period; otherwise, if weeding is not done on time, mushrooming weeds will deprive the shooting food crops of nutrients, light and space thereby retarding their growth. During the same period, short-term gestating food crops like beans and potatoes are ready for harvesting. It is therefore follows that the months of March to June are packaged with agricultural activities that are very labour demanding.

The intervening months of July and August are slack periods and farmers are relatively free to engage in other activities outside the farm. By September, maize that is planted in April is ready for harvesting. The harvesting exercise is labour intensive. It entails the harvesting of the maize combs from the farm, sun-drying it to reduce moisture content and threshing out the corn for eventual storage, marketing or storage for consumption.

Hot in the wake of harvesting is land preparation in September in readiness for the second crop season in the year. Like the previous season, the same sequences of activities are performed at similar intervals. The only variation is that the October – November rains are comparatively lighter, hence farmers prefer to plant maize varieties that take 4- 5 months to mature. This end of year period is also the main coffee peak period and yields are generally more than in the April - June season. In contrast, with

the relatively lighter precipitation, maize yields are generally lower than in the previous season.

4.1.5 Importance of cash crops to households

Having looked at how resources are allocated between food and cash crops, it is essential to examine the stakes that crop production represent in the livelihoods of households. In rational farm management models, decisions to allocate resources among various enterprises are based on their relative profitabilities; those enterprises that represent higher returns receive priority in resource allocation (Obara, 1983). In chapter two of the present study, it is well documented that cash crop farming occupies a central position in the livelihoods of smallholder farmers. The section therefore seeks to assess the returns that accrued from cash crop production. This was deemed important in conceptualizing the broader picture of the farmers' rationality/ irrationality in the balance of resource allocation (between food and cash crops) as examined in the preceding section. Respondents were first asked to state the quantities of coffee cherries that they had harvested and sold via their coffee co-operatives during the crop year prior to the interview.

Table 23: Distribution of respondents by quantities of coffee cherries harvested

Quantity (kg)	Frequency	% frequency	Cumulative frequency
Less than 250	12	17.9	17.9
251 – 500	19	28.4	46.3
501 – 750	13	19.4	65.7
751 – 1000	6	8.9	74.6
1001 – 1250	7	10.4	85.0
1251 – 1500	3	4.5	89.5
1501 and above	7	10.5	100
Total	67	100.0	

Of the 75 respondents, 2 did not harvest their coffee crop in the period under investigation while 6 respondents sold their crop through unofficial market channels. Of the remaining, findings reveal that majority (28.4%) sold between 251- 500kgs and another 19.4 % had 510- 750kg. In general 65.7% of the respondents harvested less than 750kgs of coffee, 23.8 % had between 751kg and 1500kg, and only 10.5% of respondents had over 1501kg.

The study also sought to reveal the full importance of coffee among farmers by looking into incomes that derived from the crop and how they are utilized. Respondents were asked to state the total incomes they had received from their coffee during the crop year prior to the interview. However, it emerged that majority of the respondents did not keep production and income records; as such their reliance on memory produced varied result about per unit payments even where respondents were members of the same co-operative society. Thus, a clear picture could not be formed from their responses on this.

However, from the interviews with managers in 3 different coffee co-operative societies, the researcher appreciated why complexities in per unit payments were beyond the comprehension of farmers. It emerged that cherries delivered during one crop year are pulped, fermented and dried within the co-operatives before being dispatched to millers for secondary processing and eventual marketing. In the meantime, before such coffee can be sold and proceeds made available to farmers, individual co-operative societies organize finance arrangements with co-operative banks to ensure that farmers are supplied with advances in form of cash and inputs to facilitate carrying out of farm operations for the next crop period. Below is a tabulation of per unit payments made by the 3 co-operative societies from which respondents were drawn during the crop year prior to the interview.

Table 24: Coffee payments made to farmers by co-operative societies

Co-operative society	1 st payment / kg	2 nd payment / kg	Final payment/kg	Total payment / kg
Githiru	1.50	2.50	6.00	10.00
Tambaya	2.50	3.50	8.00	14.00
Kamoko	0.70	1.90	4.50	7.10

The researcher had wanted to crosscheck data provided by respondents about their incomes from coffee with the records held in their respective coffee co-operative societies. However, such disclosures could not be made, as it would violate the confidentiality that such institutions owe to their members. Therefore, in the estimation of payments received by respondents during the period under investigation, an average (per unit) payment is employed. This index is obtained by adding the total per unit payments paid by each of the three co-operative societies and dividing this figure by three:

$[(10+14+7.10)/3]$. This average index is then used to derive average incomes earned by farmers in various quantity bands.

Table 25 **Gross incomes received from coffee** (price index Ksh 10.40 for the 2003 crop)

Quantity (kg)	Frequency	Average income /respondent	% frequency
Up to 250	12	1305.20	17.8
251 – 500	19	3905.20	28.4
501 – 750	13	6505.20	19.3
751 –1000	6	9105.20	9.0
1001 –1250	7	12299.50	10.5
1251 and above	10	72820.80	15.0
Total	67	1581.21	100

Findings reveal that majority of respondents (28.4%) earned 3,905.20 shs; 17.8% earned Ksh 1305.20. In general 65.5% of respondents received payments of below Ksh 6,500. When recoveries for loans and inputs from respondents' accounts are factored in, it would mean that average earnings were much less than what findings depict.

Some earlier studies had found that incomes that derived from cash crops are instrumental in enhancing the position of households' food security (Kennedy, 1998, Oyugi, 1984). They observe that such incomes are used to purchase food for direct consumption by households and purchase of inputs that can boost household food production capacity. Contrary to these observations are other findings that cash crop incomes are rarely spent on purchase of food or inputs into food production (Bulow et.al, 1998). The latter conclusion is founded on the thesis that within households, men and women control the cash and food crop sub-sectors respectively. As such expenditure of incomes derived from cash crops is under the control of male household heads who were observed to expend it on purchase of livestock, payment of school fees, pleasure and other activities regarded as traditionally falling within their domain. The researcher therefore sought to determine how households expended incomes derived from coffee. Respondents were asked to state items on which they spent more than 50% of their total earnings from coffee during the crop year prior to the interview.

Table 26: Distribution of respondents by disposition of coffee incomes

Item	Frequency	% Frequency
Food purchases	6	9.0
Household items	2	3.0
School fees	21	31.3
Clothing	1	1.5
Coffee inputs	26	38.8
Food crop inputs	5	7.4
Medical	3	4.5
Others	3	4.5
Total	67	100.0

Findings reveal that 38.8% of respondents spent their income on purchase of coffee inputs (this expenditure include recoveries for coffee inputs advanced during the period under investigation); 31.3% spent their income on school fees for their children; only 9% of them purchased food items; 7.4% purchased food crop inputs (again, this expenditure also includes recoveries for food crop inputs advanced during the period under investigation). Only 4.5% of the respondents spent their incomes on medical expense.

4.2 Data Analysis

Data are analyzed as discussed in the methodology section.

4.2.1Hypotheses testing

Hypothesis 1: H_0 : Cash crop production does not affect smallholders ability to be self-sufficient in food from farm production.

The dependent variable, food sufficiency, is measured as the household's capacity to be self-sufficient in food from own farm. The parameter for the said capacity in food production is taken to be the length of time (in months) that households had residual maize reserves for consumption post harvest. On that basis, respondents were grouped into 3 categories:

- a) Those who had maize stocks that lasted them throughout the season, b) Those who depleted their reserves within just two months prior to a harvest, c) Those who had depleted their maize stocks within four months after a harvest – they were labeled as being high, average and low on food sufficiently respectively.

The independent variable cash crop production is denoted by respondent's proportion of land under coffee. Those who had up to 25% of their land under cash crops are rated as low on cash crop production, those who had between 26-50%, and over 51% of their lands under cash crops are categorized as being average and high on cash crop production respectively. The scores on each of the variables are cross classified in the table below.

Table 27: Household food sufficiently and cash crop production

Food sufficiency	Cash crop production			
	High	Average	Low	Total
High	2	4	5	11
Average	11	8	6	25
Low	17	13	9	39
Total	30	25	20	75

Calculated chi-square = 11.9
 Critical chi-square at 4 degrees of freedom = 9.49
 Contingency coefficient = 0.4

The calculated chi-square value is greater than the table value. Therefore, the null hypothesis was rejected and the alternate hypothesis that cash crop production affects smallholder's ability to be self sufficient in food from farm production was accepted within 95% confidence limit.

Upon test for strength of association, the contingency coefficient was found to be 0.4, denoting a fairly strong association between the variables food sufficiency and cash crop production.

Hypothesis 2, H₀ : Resources allocated to cash crop production do not affect household's food sufficiency.

In operationalizing the independent variable "resource allocation," two indicators are measured.

- (i) Fertilizer used on coffee plots - those who used less than 1 bag (50kg) are rated as low; those who used between 1 to 2 bags are categorized as average; and those who used 3 or more bags are categorized as high on inputs use.

- (ii) Available household labour resources - in its measurement, it is assumed that available household labour resources are sufficient in coping with food production; and that this equilibrium is destabilized when the same resources are stretched to cover cash crop production.

Scores on each of the sub-variables were cross-tabulated with food sufficiency and consequently subjected to chi-square tests. The dependent variable food sufficiency is measured like in the proceeding section

Table 28: Fertilizer application within coffee plots and household food sufficiency

Fertilizer application	Food sufficiency			
	High	Average	Low	Total
High	1	2	1	4
Average	5	2	2	9
Low	3	9	5	7
Total	9	13	8	30

Calculated chi-square = 4.35

Critical chi-square at 4 degrees of freedom = 9.49

The calculated chi-square value is less than the critical chi-square. Therefore, the alternate hypothesis is rejected and the null hypothesis that there is no significant relationship between fertilizer resources applied to cash crops and level of household food sufficiency is adopted.

Table 29: Household labour resources and household food sufficiency

Household labour resources	Food sufficiency			
	High	Average	Low	Total
Adequate	3	1	1	5
Inadequate	2	8	9	19
Highly inadequate	2	13	17	32
Total	7	22	27	56

Calculated chi-square = 11.49

Critical chi-square at 4 degrees of freedom = 9.49

Contingency coefficient = 0.41

The calculated chi-square was found to be greater than the critical chi-square value. The null hypothesis is rejected and the alternate hypothesis that there is a significant relation between labour resources allocated to cash crop production and levels of household food sufficiency is adopted. When that association was tested for strength, a

contingency coefficient value of 0.41 is realized, indicating a fairly strong relationship between the variables.

Hypothesis 3 : H_0 : Smallholders farm management decisions are not responsive to commodity output prices.

The dependent variable farm management decisions is taken to be the change in acreage under cash crops in the medium term. It is assumed that all factors in farm production are variable in the medium to long term.

The dependent variable commodity output prices are indices of coffee payments to farmers per kilogram for the period 1995 to 2004. This duration is divided into 3 phases, i.e. 1995-1998, 1999-2001 and 2002-2004. Payments per kilogram for each of the years from 1995 to 2004 were obtained from each of the 3 co-operative societies from which respondents were drawn. Payments for each 3-year phase (for all the coffee co-operatives) were added up and then divided by 9 to yield a price index for that (3-year) period. It is assumed that price index during one phase can influence farmers' decision on whether or not to adjust their holdings under coffee during subsequent phases. Scores on coffee index prices are cross-tabulated against food sufficiently in the table below.

TABLE 30: Farm management decisions and commodity output price

Change in acreage under coffee	Coffee index prices			
	1999-2001 (low)	1995-98 (Average)	2002- 04 (High)	Total
Positive	3	2	1	6
Negative	4	1	3	8
Total	7	4	4	14

Calculated chi-square = 1.54

Critical chi-square value at 2 degrees of freedom = 5.99

Calculated chi-square value was found to be lower than the critical chi-square value. Therefore, the alternate hypothesis is rejected and the null hypothesis that smallholders' farm management decisions are not responsive to commodity output prices is upheld. The observed poor response to price increases could be explained by the fact that real producer prices have worsened over time in the sense that terms of trade between

inputs and outputs have worsened. Therefore, the slight price increments do not provide adequate incentives for an increased allocation of land to coffee.

4.3 Discussion and interpretation of findings

This section discusses the data presented in the preceding section.

Distribution and access to resources among rural farm households is influenced by the patriarchal organization of family units and other social institutions. For instance, some studies have observed a correlation between sex of household heads and their access to agricultural resources, inputs and farm-level decision making (Bulow et.al, 1998; Obara, 1983). These have been observed to be in favour of male than female household heads. Though the present study does not measure association between such variables (gender of household head and access to farm resources); findings of a high proportion of female-headed households (38.7%) would nonetheless suggest that a sizeable proportion of farmers lack entitlements to agricultural resources such as credit, land, farm inputs, among others owing to their gender (table 1).

The size of household is important in determining supply of labour. Alternative demographic theorists such as Caldwell (1975) make the observation that African farm households have large demographic structures that correspond with their labour power provision expectations. Accordingly, labour requirements for farm activities are supposed to be met from household members.

The above expectation is however contradicted by our survey evidence that revealed a relatively low demographic structure averaging 5 persons per household (see table 3). The search for opportunities outside agriculture and the rise in (especially primary) school enrollments all contribute to low numbers of present members within households, thereby depriving them of potential labour for farm activities. For instance, close to lunch hour, most women house heads were found busy preparing lunch for their school going children. Another one said to the researcher, "most of the times I am overwhelmed by my farm work. After finishing school, my children went to their uncles in Nairobi in search of employment." It is therefore unlikely that sizes of households are calculated to fulfill requirements for farm labour in the district of study.

While education can affect farmers' agricultural productivity, the survey findings reveal prevalence of a lowly educated rural farm population (see table 4); for example, 68% of respondents had standard 8 education and below. This low level of education among smallholder farmers has also been noted by Masimba (1986). The tendency of well-educated people to shun employment in agricultural occupations in Kenya is rooted in a historical attitude developed during the colonial period where the labour market was racially segregated. White collar and blue collar jobs were dominantly a preserve of Europeans and Asians respectively, with Africans not only relegated to the uncolourful agricultural occupations but also oftenly compelled to provide compulsory labour in the settlers' plantations.

With independence and access to education, many educated Africans sought to "flee" from agricultural occupations to other sectors of the economy (see Masimba, 1986). From survey findings, low level of educational attainment observed among smallholder farmers is likely to be the result of that historical attitude coupled with the low incomes deriving from agriculture. Hence a predilection by people to search for employment in the industrial, service and informal sectors away from agriculture.

Despite the finding that farming is the main occupation to a majority of respondents (62.7%), their potential to expand production is severely constrained by small land sizes (see table 5). Average land size was found to be 1.9 acres with a mode of 1.1 (see table 6). Dominance of small land parcels is mainly due to the district's high population density (Nyeri District Development plan, 2002). This contributes to the rise in land subdivision especially that characterized by inheritance of land from fathers mainly through their male offspring. For example, in underscoring problem of small land sizes, one respondent remarked, "My father had 3.5 acres of land, after dividing it amongst us 5 sons, we each got 0.7 of an acre. On my portion I cultivate food crops and coffee; besides, my homestead and pasture are also within the same parcel." Small land sizes in the can also contribute to diminished productivity reflected in low farm output and over- utilization of soils.

Scholars note that the degree to which farmers have turned to production for the market is reflected in the extent to which land is devoted to cash crops (Cleave, 1974; Omosa, 1998). Therefore, in view of the general land scarcity among smallholder farmers, the finding that 45.1% of aggregate land resources were allocated to cash crop production relative to 40.4% that to food crops, obviously further deteriorated land scarcity among farmers thereby reducing the land potentially available for cultivation of food crops (see table 8). It is likely that the subsistence nature of food crop production undermines its prominence and reduces it in importance relative to the cash crop, coffee.

Although farmers cultivate a wide range of crops, it emerged that all of them cultivated maize; and this made the researcher to conclude that it was the staple food for families in the study areas with other foodstuffs only being meant to supplement it (see table 9). This was evidenced by many respondents one among them who posed to the researcher, 'if I don't partake maize in any of its component forms (green, cereal or flour) for my meals, what other choices of food are available to me?' Hence, whenever maize stocks are in chronic shortage or exhausted at household level, hunger is likely to be experienced.

While it constituted the district's staple, maize output is generally low. For example, 79.7% of respondents had up to 3 bagfuls of the crop and a mode of 2 bags (see table 10). The import of this finding is that while maize is the major staple food in the district, majority of households produce low quantities of it, thereby implying that in the absence of other reliable alternative food sources, majority of households can face imminent and prolonged food hunger in between harvests. The severity of deficiency of staple food was underscored by a respondent, "I exhausted my maize granary two months after the harvest; I therefore practically live like town dwellers who have to earn money to buy food every day, and this will continue up to the next harvest"

Indeed, findings reveal that majority of respondents (52.9%) had by the 4th post-harvest month, depleted their staple reserves and were reliant on markets for their consumption needs (see table 14). In the last two pre-harvest months alone, 47.1% of respondents were reliant on markets for their staple food requirements. This large number was however expected since food shortages arising from shortfalls in harvests are mainly

concentrated in the last two pre-harvest months. Such periods are described as “lean” or “hungry seasons” but are assumed to be temporary since harvests are “around the corner” and therefore times of plenty imminent (Omosa, 1998). From the findings, majority of households (52.9%) experiences food shortages that stretch their boundaries beyond the lean periods. As a result, such food shortages go beyond seasonal hunger to take the form of permanent hunger within individual household units. It is likely that prevalence of such hunger does not capture attention of policy makers because in its nature, it is not “open” but rather a “hidden” form of hunger. Indeed, test of hypothesis revealed that cash crop production has a significant effect on food sufficiency (table 27).

Also noteworthy, is that farmers’ participation in the sale of staple food in the markets was low at 12% (see table 15). The implication is that whereas maize is widely grown in the district of study, it is a subsistence activity therefore supporting the argument of this study that households seek to be self- sufficient in food from their farms. Therefore, from the findings, any shortages in staple foods among households in the study areas cannot be said to arise from its appropriation through market exchange. This finding contradicts that of an earlier study, which found that such shortages of staple food within households are partly because of its sale in the markets (Omosa, 1998). However, the latter study was done in a high potential district notable for its share of grain output towards our national food reserves. Therefore, while most of its maize output is destined for the market, that among farming households in Nyeri district is predominantly for subsistence.

Other important foodstuffs were also found to be produced in low quantities. For example, 82% of respondents had less than 40kg of beans (see table11). The implication is that, despite beans constituting an important and cheap source of proteins among rural farm households, it is apparent that majority of households have inadequate quantities of it; and it is therefore likely that household members and especially young children lack sufficient quantities of it and are most likely malnourished.

A large proportion of farmers (44%) in the district applied fertilizer to coffee with 45.6% applying it to other crops (see table 16). These data reveal that farmers allocate this

yield- enhancing resource almost in equal proportions between food crops and cash crops. However, chi-square test does not reveal a significant relationship between application of fertilizer to cash crops and levels of household food sufficiency (table 28). Most likely this is because its high cost is an obstacle to its access by many farmers. A similar conclusion is by Nyangito and Okello (occasional paper, October 1998) who attribute low inputs use among smallholder farmers to prohibitive costs. Contrary finding is that fertilizer application to cash crops increases its yields resulting to higher incomes that in turn enable purchase of yield enhancing inputs into food crop production (Oyugi, 191984). The latter observation is however attributable to residual effects of fertilizer use and applies to where crop rotation is practicable between a short-term cash crop and a food crop (Raikes, 1988).

Findings on application of pesticides reveal that its use is skewed in favour of coffee (53.9%) with a smaller proportion (33.3%) being reserved for maize crops (see table17). In general, with the low use of pesticides is observed among staple food crop, it is likely that its destruction by pests is not greatly minimized. Moreover, since majority of respondents applied pesticides to cash crops, imply that a higher premium is put on cash crops than food crops.

The predilection towards cultivation of cash crops is evidence that capitalist relations of production have penetrated peasant production, the former in which even social relations to a great extent are monetized. For example, Omosa (1988) observe that kin and friends pursue social bonds with those relations from which they derive material benefits. Taken to an extreme, such ties are mainly important in so far as benefits accruing from such relations remain valuable to them.

As the survey findings depict, use of hired labour is more popular than communal labour (see table 21). It is likely that communal labour is unpopular because of inefficiencies attributed to group tasks. Hence the observed higher preference for hired labour, implying that for households that get labour from external sources, labour negotiations takes place within the context of market exchange.

From the discussions, it emerged that the coffee peak harvesting period of April – June and November –January coincide with periods when planting and weeding of food crops are at peak (see table 22). In such circumstances households therefore have to make decisions about how to allocate available labour between food crops and cash crops. Studies in Papua New Guinea reveal that when labour peak periods for cash crops and food crops coincide, farmers tend to concentrate most of their labour resources on the cash crops; effects of this reflect at a later stage in reduced food crop yields (Bourke, 1988). Thus, the needs for farmers in the study area to work on several crops and operate within the constraints of climatic time spans exert pressure on available labour resource. It was gathered that in such situations, many farmers concentrate available labour resources to the cash crop for fear of potentially losing the crop to the process of over-ripening and fermentation. In making such decisions, farmers lose hindsight of the fact that rain, like tides, waits for no man. It is therefore likely that the resulting delay in tending to food crops adversely affects household food production in the study areas.

In export farming, great importance is placed on increasing volumes. Besides this being important in ensuring higher earnings and offsetting effects of adverse crop prices, crop volume is also used as a basis for advancing loans and crop inputs. Findings reveal that coffee volume delivered by a farmer in a previous crop year is used as a yardstick for assessing his credit worthiness, hence amount of loan or inputs a farmer is eligible for in a crop year. Importantly too, is the fact that cherry quantity also determines incomes that potentially accrue to a farmer. Therefore, the finding that majority of farmers (74.6%) deliver low quantities of cherry (less than 1000kg) imply that majority receive low incomes for their coffee deliveries and are therefore eligible for small loans from their co- operatives in a subsequent crop year (see tables 23 & 25). Such real and potential benefits that accrue from the cash crop are too little to make an impact on food or cash crop improvement. Moreover, most of the coffee income is spent on school fees (31.1%) and coffee inputs (38.8%); responsibilities typically reserved for male house heads. A similar observation is made in a study on effects of sugarcane production on food security in Western province of Kenya (Kennedy, 1989). Therefore, cash crop production is unlikely to aid self-sufficiency in food among households, since its income is predominantly controlled by males who make preferential allocations away from households' food- related projects.

5.0 CHAPTER FIVE

5.1 Summary of findings and conclusions

This study set out to analyze the influence that cash crop production has on household food sufficiency from farm production. It was meant to reveal the kind of inter-relations existing in the allocation of farm-level resources between cash crops and food crops and their implications on food crop yields. The study was also meant to illuminate on how some institutional policies on agriculture have ramifications on the differential allocation of resources between cash crops and food crops.

The principle presumption of the study was that cash crops have the potential to influence food crop production. It assigns great significance to the attainment of household food sufficiency through farm production. Attainment of such sufficiency in food depends on extent to which households are entrenched in production for export.

An assessment of secondary literature revealed conditions under which food and cash crop production takes place. The study area was found to have medium agricultural potential as indicated by the annual precipitation and general climatic conditions. Most of the soils were fertile, though this has obviously been adversely affected by years of repeated cropping.

Field survey revealed dominance of an ageing rural farm population. For example, 50.7% of household heads surveyed were 50 years and above. In addition, the farm population was found to be lowly educated with 68% of respondents having had only primary school education and below. Age and levels of education influence adoption of agricultural innovations and practices and hence overall productivity. Absence of youthful and educated rural farm household heads could be due to the low incomes that derive from that sector as revealed by survey findings. Therefore, unavailability of skilled and energetic farm-level decision-makers is one aspect that contributed to stagnation of agriculture in the study areas.

An assessment of land holdings revealed small holdings of 1.9 acres on average with a mode of 1.1 acres. This is due to the high population density in the district hence a high incidence of land devolution from parents to their progeny through inheritance. Such

smallholdings portray intensification of land use as evidenced by the diversity of crops cultivated by farmers. However, despite their efforts to optimize output from land, socioeconomic and ecological conditions set broad limits that limited agricultural intensification that farmers could adopt (Farvar, 1976). Farmers were observed to suffer from land and financial constraints. Such constraints rendered many of them to operate way below their full resource potentials.

With regard to allocation of land resources between cash and food crops, it was found out that allocation was skewed in favour of cash crops than food crops. For example, it was found that 65.4% of respondents had up to 50% of their lands under cash crops. Obara observe that farmers allocate their resources between crops based on their (crops) differentials in relative values (1984). Field survey revealed that food crop production was predominantly for subsistence thereby implying that cash crops are regarded as more valuable hence get priority in land allocation

In connection with land allocation, yields of food crops were found to be generally low to sustain households throughout the season. Normally, food shortages are experienced within the last two months prior to a harvest, time during which households routinely purchase food as they await a harvest. However, maize, which was found to be the district's staple food, was low in output. For example, only 14.5% of respondents were found to have harvested enough maize to last them throughout the season. Moreover, of those who resorted to the markets, 53% of the started making purchases very early (within 1-4 months) post harvest. These imply that majority of farmers deplete their food harvests very early during the post-harvest season. Data analysis revealed a strong statistical relationship between land devoted to coffee and levels of household food sufficiency. This denotes that allocation of land to cash crops reduce resources potentially available for cultivation of food crops.

The variable resource fertilizer application to cash crops was found to have no significant influence on levels of household food sufficiency. Among those farmers who applied fertilizer to cash crops, majority were found to have sourced it from their coffee co-operatives, its value to be deducted from their coffee accounts when payments became due. It had been expected that fertilizer application would enhance cash crop

yields, whose increased incomes was assumed could enable farmers purchase more inputs into food crop production (see Oyugi, 1984). Our finding to the contrary could be because expenditures of coffee incomes are mainly determined by male house heads who allocate it away from projects that support household food production. The high costs of fertilizers also deter farmers from their heavy use.

On the intensification within food and cash crop plots respectively, the findings revealed an orientation to practice intercropping within the food crop plots, than within the cash crop ones. For instance, 77.3% of respondents intercropped within their food crop plots. Intercropping was found to be farmers' attempts of dealing with congested land sizes. Farmers cultivated a diversity of food crops in attempts to fully exploit limited land resources in their desire to meet their households' food needs. Some of the major food crops cultivated like maize, beans and potatoes had different gestation periods, while other subsidiary food crops like bananas, cassava and sweet potatoes were cultivated all-year-round. While intercropping ideally diversified their food base, it obviously led to over-exploitation of soil potential which reduced its carrying capacity with each successive cropping season.

On the other hand, intercropping within coffee plots was discouraged by the coffee co-operatives. Likewise, coffee husbandry practices as spelt out in the coffee Act also underscore pure stand cropping. The rationale being that introduction of other crops within the coffee fields would lead to competition for soil nutrients, space, spread of other crop pests and diseases to coffee among others. This would result to a decline in quality of coffee cherries and consequently low coffee prices. Survey findings revealed that 76% of farmers adhered to this recommendation on pure stand cropping. This therefore intensified shortage of land available for food crop production.

An assessment of policies with regard to their bias in support of either the cash or food crop sectors revealed a predilection to the former. Official resource allocations to extension programs were found to be low as evidenced by low farmer contacts with extension officers. Nonetheless, findings revealed a tendency to concentrate contacts with respect to cash crop than food crops. For example, only 8% of farmers were found to have had some contact with extension officers with respect to food crops, while 24%

reported some contact with respect to cash crops. That apparent under-emphasis on food production compounded the problems of food production at household level. Majority of farmers therefore did not get access to information on how they could improve food production from extension officers.

The study looked into how households divided their labour time among diverse farm activities within one-year period. Emphasis was on how available household labour coped with the diversity of farm activities on cash and food crop fronts. It was found that coffee has two peak harvesting periods – April to June and November to December. Coffee picking was a labour intensive activity. Besides harvesting, farmers did primary sorting of the cherries before they delivered it to the factories, where they again did secondary sorting before eventual grading and weighing. Also noteworthy is that coffee collection was not decentralized; therefore, majority of farmers walked for average distances of 3-5 kilometers to deliver their crop to the factories. This task was found to be physically exerting and was performed by energetic persons.

It was found that both coffee-picking seasons coincided with the rainy seasons, time when farmers planted and weeded their food crops. Harvesting of the short-gestation crops like beans and potatoes also fell within the coffee picking seasons. Each of these activities were found to be very crucial in that their timely performance determined the quality and quantities of respective crop yields. Interviews revealed that such peak periods exerted pressure on available household labour resources. Respondents revealed that when faced with labour shortages at such times, priority was given to crops with higher relative values. Indeed, this is supported by statistical analysis, which revealed a strong association between how available household labour resources were allocated and their levels of food sufficiency. It is therefore concluded that the observed low food crop yields in the district of study was also as a result of alienation of labour resources to cash crop production. Similar findings have been made in studies on how commodity production impact on labour allocations between food and cash crop sectors in Mwea and New Papua Guinea respectively (Asamenew and Mwangi, 1985; Bourke, 1988).

An examination into how commodity market prices influenced farm management decisions revealed no significant correlation between the two variables. It was therefore concluded that market prices did not influence how farm production was planned, specifically with respect to estimation of acreage that would enable farmers meet their projected production and income targets. In the light of rational farm management models, it had been expected that their farm production decisions would be responsive to market dynamics. As such it had been expected that all productive factors could be varied in the medium to long-term to reflect input combinations at which farmers would be capable of at least realizing their production costs. Cash crop production as a productive factor when committed to land was observed to attain relative rigidity from which farmers could not freely exit even at deteriorating returns relations. Thus far, the findings indicate that cash cropping transmitted adverse consequences that manifested in reduced abilities by households to attain self-sufficiency in food from farm production.

The above findings can be explained within the context of the theory of peasants and modes of production (Boesen and Mohele, 1979). It elaborates about how peasants are drawn into the market economy by the process of extending into the livelihoods a market oriented commodity. The above unfolds in a complex process that entails employment of a blend of economic, political and administrative tools to ensure their total mobilization into market production.

Gradually, through model of economic growth that lay emphasis on export crops, successive generations of peasants come to adopt cash cropping as an avenue to their ideals of economic "self actualization" through reliance on their available resource base-land and labour. Their decisions on adoption are made in view of the higher values represented by cash crops relative to food crops. This process consigns food crop production to the margins of agricultural development.

Thus, focus on cash crops both at aggregate and micro levels has led to the systematic translocation of the resources from food to cash crop sector, the latter which is controlled by capital. While surplus value is appropriated by the capitalist, the peasants/laborers gets an income equivalent to a wage to support reproduction of their labour power. Therefore, despite farmers' ownership of land, they lack control of the

products of their labour; since other actors influence marketing and price determination. The wage that farmers get for their products is often too low to sustain production. According to the theory, even subsistence production is never free from exploitation by capital, especially where it is pursued side by side with market production. Therefore, when coffee incomes fall below cost of production subsistence peasant production becomes a necessity to subsidize for the cost of market production. This explains why farmers are able to sustain cash crop production even when returns fall below cost of production.

5.2 Recommendations

5.2.1 Recommendations on policy

It was expected that the study would generate knowledge about how cash cropping affected smallholders' food sufficiency positions in the study areas; with a view to such knowledge being inputted into policy formulation. The following steps are therefore recommended:

There is need for formulation of policies that can target households by way of directing public resources to subsidize on essential farm inputs that are commonly used by smallholder farmers. For example, reduction or waiver of duty on agricultural inputs could result to the onward transmission of low input prices to farmers. This could be complemented by the deliberate promotion of agricultural technologies and practices that are amenable to adoption by smallholder farmers.

The survey findings found that farmers were not incorporated in the formulation of the districts' agricultural plans; their involvement was relegated to field implementation. There is need to involve them in the formulation of the district's agricultural agenda right from research, formulation of policies and implementation. It is only then that real challenges facing them can be identified and solutions searched for.

Farmers should be discouraged from growing cash crops on very small and uneconomical parcels of land. The study found that smallholders are also insensitive to market indicators; as such, policy strategies to enhance expansion of their output should stop focusing much on producer prices, but rather specific strategies should be

devised tailored to suit environmental and socio-economic conditions surrounding various categories of farmers.

5.2.2 Areas of further research

The following are proposals into areas that require further research: The study appreciates that in the discussion of any aspect of well being, examining households in the aggregate is not sufficient; just like national food availability data is an unsuitable proxy for household food sufficiency, so might household- level food sufficiency assessments offer poor proxies for the individual's well being. For example, children and pregnant women are vulnerable to events that can contribute to reduced food consumption. There is therefore need for more disaggregated analysis in examining food security of individuals within households.

Intercropping was found to be common in the district of study. Therefore, a careful intervention in the region would yield fruitful dividends. Such interventions could be informed by research on the crop varieties that can be compatible with each other; and development of appropriate technologies for key tasks such as planting, weeding, fertilizing and harvesting within contexts of mixed cropping.

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The influence of cash cropping policies on food production among smallholder coffee farmers in Nyeri district.

Household survey.

Dear Respondent, my name is and I am a student from University of Nairobi. I am carrying out a study to examine if coffee farming does influence food crop production. Please allow me some time to ask you some questions. Confidentiality shall be maintained.

Household characteristics

Name of respondent age
Division
Location Sub-location

1. Type of household
- | | |
|------------------|--------------------|
| a. Female headed | c. Child headed |
| b. Male headed | d. Other (specify) |
2. Current number of present household members and their stations of work. (give numbers to household members)
- | Household member | sex | stationing work (e.g. student, farming etc) |
|------------------|-------|---|
| 1..... | | |
| 2..... | | |
| 3..... | | |
| 4..... | | |
| 5..... | | |
3. What level of education did you attain? (tick as appropriate)
- | | |
|----------------------|--------------------------|
| Did not go to school | |
| Primary std 1-4 | Secondary F 3-4 |
| Primary std 5 –8 | Secondary F5 –6 |
| Secondary F. 1-2 | Post secondary (specify) |
4. What is your main occupation
- | | |
|------------------------------------|--------------------------------|
| a) Farming | b) Formal employment (specify) |
| c) Small scale business | d) Agricultural casual laborer |
| e) Non-agricultural casual laborer | f) Others (specify) |

Land holding and land use

1. What is the size of your land (acres)
ii. How did you acquire it? a) purchased b) inheritance c) others (specify)
2. Who makes decisions about your farm activities?
3. (i) How much of your land (in acres) have you allocated to the cultivation of :
- | | |
|------------------|--------------------------|
| a. Maize..... | d. Coffee..... |
| b. Beans..... | e. others (specify)..... |
| c. Potatoes..... | |
- ii. How much of your land is uncultivated?.....
- iii. have you rented additional land from other land owners?
YesNo..... If yes:
a. What size..... acres
b. What crops are you cultivating on it?.....

4. During the last season, which cropping system did you adopt for cash crops and food crops. (tick as appropriate)

Farming system	Cash crops	Food crops
Monocropping
Intercropping
Row planting
Rotational farming
Others (specify)

(b) What are the reasons for the adopted farming system?
explain

5.(a) which crop varieties did you cultivate during last season?
Specify.....

(c) How much food crop yield did you:
- Sell in the market (specify crop and quantity).....
- Give to relatives (specify crop and quantity).....

Food sufficiency

1 (a) Did the food crop yields realized last up to the previous harvest season? Yes..... No
..... if no go to (b)

(b) For how many months did each of the following crop output last?

Crop	Number of months(post harvest)
Maize
Beans-
Potatoes

(a) After exhaustion of your maize reserves, did you resort to buying basic food from the market? Yes Noif yes go to (b)

(b) for how many months did you have to buy maize in the run-up to the previous harvest season? (Specify months of the season).....

1. How many meals per day has your household partaken on average during the last one week? One.....2..... 3 and more.....

Crop husbandry

1. What inputs did you use during the last crop season?

Crop	inputs (specify type and quantities)
Maize
Beans
Potatoes
Coffee

2. (a) What were the sources for those inputs.

Crop	Source: (e.g. merchant shops, coffee cooperatives, others specify)
Maize
Beans
Potatoes
Coffee

b. What were the modes of payment for the various sources.

Specify.....

3. What do you attribute to the quantity yields you obtained for:

Food crops.....

Cash crops.....

Coffee

- 1.(i) What quantity (kg) of coffee did you harvest during the last crop season?.....
- (ii) Where did you sell it?
- (a) Did not sell it (b) sold to brokers,(c) to cooperative societies
if 'c' go to 2
2. What total income did you receive during that crop year?.....
3. From your assessment, did you make profits or losses during that crop year? Explain..
4. How did you spend incomes that you derived from coffee?

Type expenditure	Proportion income
Food
Household items
Medical
Coffee inputs
Food crop inputs
School expenses
Others (specify)

- 5.(a) How are you adjusted your acreage under cash crops from 1995 to 2004

- (i) Increased.....
 - (ii) Decreased.....
 - (iii) No changes.....
- if i or ii go to(b)

- (b) Those adjustments were made during which year(s)? _____

Utilization of resources between coffee and food crops

1. (i) Where did you source labour for your farm activities during the last season. (tick as appropriate

Source	food crops	coffee crops
Household members
Hired exclusively
Household and hired
Household and communal
Household and relatives
Others (specify)

- ii. How often did you make use of hired or communal labour during last season.

Frequency of use	Type of labour	
	hired	communal
Rarely
Sometimes
Often
Always

2. How much did you approximately spend on farm labour operations last season?

Food crops
Cash crops

3. What farm equipments do you own and use (specify).....

4. (i) Did you experience any labour shortages during the last season? Yesno if yes go to (ii)

- (ii) How would your household labour resources have coped with:

Food production alone :

Adequate.....

Inadequate.....
Highly inadequate.....

(iii) How did the same household labour resources rate in view of scope of total farm activities (for the combined food and cash crops) during the same season? They were:

Adequate inadequate highly inadequate.....

5. Did you receive any farm of credit to aid your farm operations during the last season?

Yes..... No..... if yes go to (ii)

ii. What kind of credit (specify)

type

sources (e g. coffee cooperative, bank, self- help groups etc)

Cash (specify amount)

Inputs (specify type and quantity).

Others (specify)

iii) What proportion of that credit did you use on:

Crop type

proportion

Food crops

Cash crops

Others

6. Have many times did you receive advice on crop improvement from extension agents during the last one year?

No of times food crops cash crops

None

One

Two

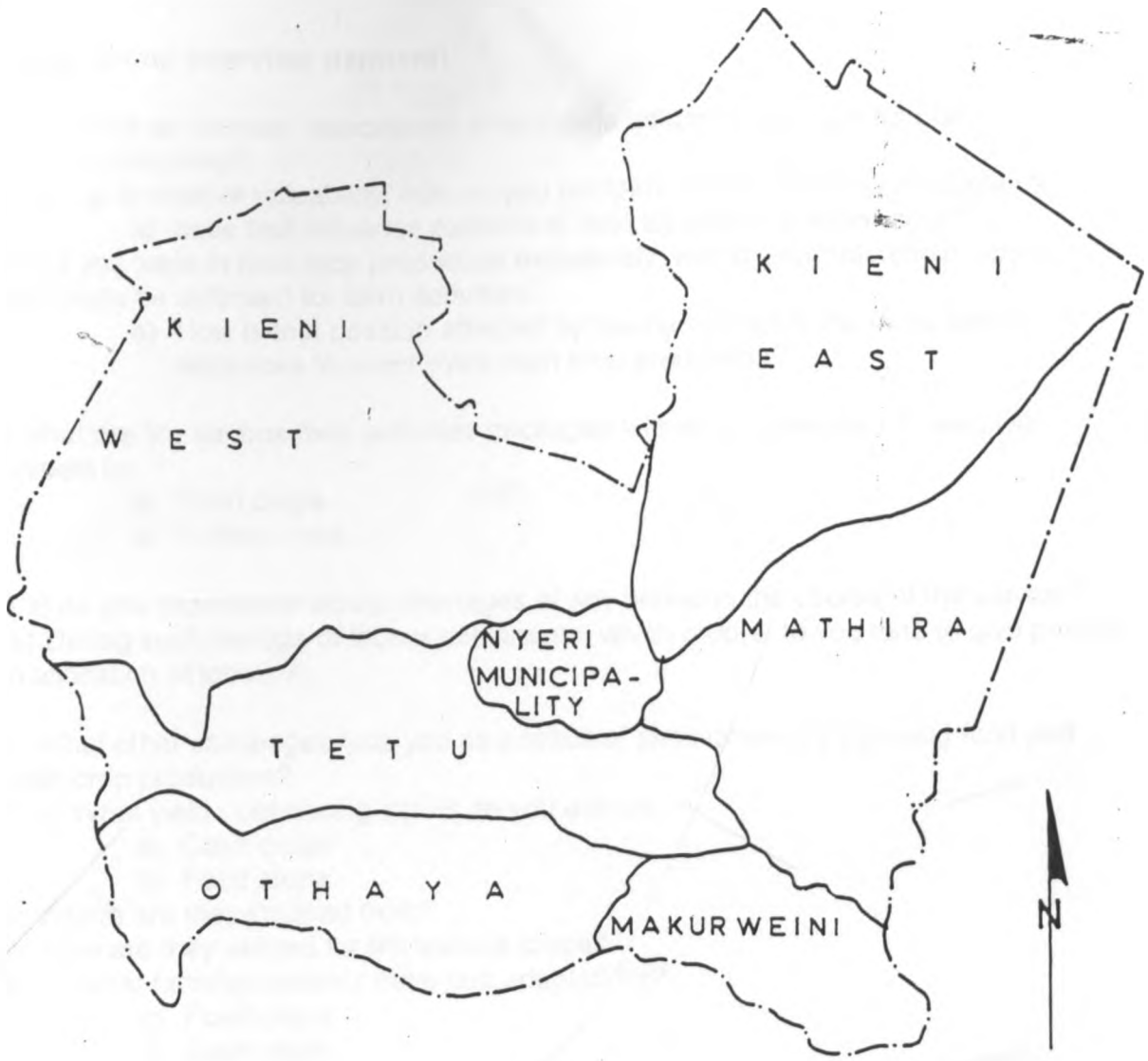
Three and above

Anything else you would want to add?

THANK YOU

NYERI DISTRICT

ADMINISTRATIVE BOUNDARIES



LEGEND

-  District boundary
-  Divisional boundary

5 10 15 20 25Km

Focus Group Interview (farmers)

1. How do farmers' educational attainments influence their agricultural productivity?
2. a) in relative valuability, how do you compare coffee and food production?
a) does that influence patterns of land allocation to either crop?
- 3.a) if you were in food crop production exclusively, would your household labour resources be sufficient for farm activities?
b) How is that position affected by having to stretch the same labour resources to cover even cash crop production?
- 4.what are the various farm activities packaged within two seasons (1 year) with respect to:
 - a) Food crops
 - b) Coffee crops,
- 5.a) do you experience labour shortages at any period in the course of the season?
(b) During such periods of labour constraints, which crop(s) to you tend to give priority in allocation of labour?
6. What other challenges face you as a result of simultaneously pursuing food and cash crop production?
7. (i) What yield - enhancing inputs do you use on:
 - a) Cash crops
 - b) Food crops
 - ii) Where are they sourced from?
 - iii) How are they utilized for the various crops?
- 8.(i) What farming systems have you adopted for?
 - c) Food crops
 - d) Cash crops
 - ii) What are merits of such farming systems?
- 9.(a) how often do you get advice on how to improve your agriculture?
(b)From what sources?

Key informant interviews (coffee co-operatives, KPCU)

1. What are objectives of cultivation of coffee by farmers?
2. What processes does coffee undergo from time of harvesting to time of consumption?
3. How is coffee graded?
4. How is it marketed/sold?
5. How are prices paid to farmers determined?
6. What charges are levied from coffee proceeds?
7. What are requirements for entry into coffee cultivation.?
8. What facilities are extended to farmers to support ?
 - a) Coffee sector?
 - b) Food crop sector?
9. What payments did farmers receive for each crop year from 1995 to 2004?
10. What issues would you cite as obstacles to coffee production.?

Key informant interviews (district agricultural officers)

1. What institutional support is available to farmers with respect to
 - a. Food crop production
 - b. Cash crop production
2. (a) How many extension agents are allocated per division?
(b) Do they advise on how farmers can improve their production even within contexts of mixed cropping?
3. (a) What innovations are tailored for adoption by resource-poor farmers
(b) At what stage(s) are farmers involved in the formulation of those innovations
(c) Do you monitor extent of adoption of such innovations by farmers? How often
4. (a) The district development plans indicate the district has been a net importer of food. What would you attribute to that insufficiency in food?
5. Would you say coffee production has adversely affected food crop production in view of their utilization of same resource base?